ANTIMARI: SOCIOECONOMIC ADAPTATION AMONG AMAZONIAN RAINFOREST EXTRACTIVISTS

By

GARY WILLIAM SHAEFF

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Dedicated to

Phyllis Nix

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By

Gary William Shaeff

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This dissertation describes the socioeconomic and cultural-ecological adaptation of the people of the Antimari area in the Amazonian state of Acre, Brazil. It provides analysis of the effects that economic inflation and declines in market prices offered for natural rubber and Brazil nuts have had on the household economic strategies of these traditional rainforest people who derive a livelihood through the extraction of non-timber forest products, subsistence horticulture, hunting and fishing. Rooted in historical, political-economic, and environmental considerations, the dissertation emphasizes the effectiveness of diverse adaptive strategies, especially migration, in the face of changes in regional, national, and international political and economic circumstances.

The economic strategies of traditional peoples have been recognized as important to understand because they give insight into long-term practices which affect resource use and provide insight into local adaptation to uncontrollable economic externalities.

CHAPTER 1
INTRODUCTION

In the past, social science has generally viewed traditional communities as socially and economically isolated units. However, the relationships and interdependencies among household, regional, national, and international levels are gaining increasing recognition. As small, traditional communities that are relatively unincorporated into the world economy are rapidly disappearing, there is an increasing need to understand the causes and effects between external phenomena and what is happening on local level. In anthropology the concern goes back at least as far as Margaret Mead's 1955 work, *Cultural Patterns and Technical Change*. But more recent publications also illustrate the need to link national and international phenomena with what is happening on local levels (see Bennett 1985, Moran 1990, Schmink and Wood 1992). The result has been new interdisciplinary theory and methodology, studying the effects of macro-level events on micro-level communities.

As links between less-accessible regions and the global economy grow, it becomes more important to examine how this trend affects people who live in remote areas and who are increasingly affected by distant economic factors. What happens to traditional communities when they are so affected by global economics that their historical lifeway no longer provides the means of maintaining their standard of living? Some people may simply migrate to another lifeway in another place and forsake the traditions of their ancestors. Others may remain where they are but adopt a new way of living that is more compatible with a changing world. Still others, trapped by poverty and a lack of alternatives, may continue their traditional ways despite a decreasing level of well-being.

All options require making choices and all choices represent socioeconomic strategies that attempt to adapt to changing externalities over which local people have no control.

Analysis of social and economic production is fundamental to the study of these adaptations but it is often difficult to sort out internal and external causes and effects in the complexities of most societies. However, isolated frontier communities offer a context that affords researchers one of the best pictures of how household economic strategies are adapted to external change (Blau 1977). This dissertation examines what happened to the families of the Antimari river area, a geographically remote community of rainforest extractivists on the frontier of the Brazilian Amazon, when their lifeway was rendered obsolete by soaring economic inflation and a decline in market demand for the natural rubber that they traditionally extracted from the rainforest. In Antimari, extractivism was based primarily on the collection of Brazil nuts and rubber. This activity supplied the majority of their basic needs with products from the forest (hunting, fishing, gathering, medicinals, construction and artifact materials) in a system which is highly adapted to the local tropical rainforest ecology and which results in minimal damage to the environment. Despite their extreme geographic and economic isolation, residents of Antimari are not completely autonomous nor are they solely extractivists. Rather, they engage in a wide variety of subsistence and production oriented activities that fluctuate depending on individual familys' demographic, economic, and natural resource circumstances, as well as on marketing constraints and prices. The residents of Antimari have employed their traditional economic strategy for over 100 years. However, without their articulation with an external economy and a market demand for products extracted from the rainforest, it is impossible for them to maintain their traditional lifeway. Recently, their livelihood has been compromised by changes in commodity price policies practiced by the Brazilian federal government starting in the 1980s, specifically its decrease in price supports for the domestic rubber industry on which local rural people depend. These policy changes at the national level, combined with the effects of crippling economic inflation prior to the success of the Real Plan of economic stabilization in 1994, and a decline in the demand for Amazonian rubber, have caused an increased marginalization of the region's rural people who have depended on the rubber tapping industry for generations, and propelled a rise in their migration from their rainforest homes to urban areas. Thus, as these market-driven, changes occur, it is important to understand the nature of their impact on traditional rural extractivists, evaluate the adaptive strategies that people have chosen, and determine their usefulness in informing policy regarding the future of rural people under similar circumstances. The research will show that some families adapted by emigrating, some stayed in Antimari but changed their production strategies, and others emigrated only to return to their traditional lifeway in the rainforest after a brief time in the more technologically oriented world.

Characterization of the Study

This dissertation describes the socioeconomic and cultural-ecological adaptation of the people of the Antimari area in the Amazonian state of Acre, Brazil when faced with diminishing market demand for products extracted from the rainforest. It is an analysis of local families' lifeways and the knowledge, behaviors, technologies, and economic strategies that have enabled them to exist at their current level of well-being but it also provides insight into the effects regional, national, and international political and economic externalities, and declines in market prices offered for natural rubber and Brazil nuts, have had on economic strategies of these traditional people who until recently have pursued a livelihood based largely on the extraction of rainforest products. It shows how national and international politics and economic trends affect traditional extractivists living in a remote areas of Brazil's Amazon rainforest.

Rooted in historical, political-economic, and environmental considerations, the dissertation will emphasize the effectiveness of these diverse economic strategies and how they are affected by regional, national, and international political and economic externalities. Accordingly, analysis will be at the household, local, regional, national and global levels. The goal was to document ethnographically the lifeway of Antimari and thus provide a framework in which to quantitatively and qualitatively assess adaptive economic strategies. Because systems of labor, resources, production, consumption and exchange cannot be adequately or meaningfully analyzed outside of the cultural and ecological settings in which they are embedded, the research objectives included the analysis and interpretation of data from demographic, social, political, technological and ecological domains. It was also essential to examine the history of Antimari to understand causes and reactions. Finally, the research establishes baseline data on the area for future local studies and informs the process of predicting outcomes elsewhere under similar economic and ecological conditions.

General Organization of the Dissertation

The dissertation moves from the historical to the current and from the macro to the local level of analysis. Chapter two addresses the theoretical framework of the research and how data was collected and analyzed. Chapter three places Antimari in its geographic context by providing information on the physical setting including information on climate, topography, hydrology, local flora and fauna, and how these resources are used by Antimari's resident population. Chapter four traces the history of human occupation of the area from the earliest known indigenous population, through the first explorations and eventual settlement by Europeans, to its current population. Chapter five gives an ethnographic overview of the current population, discussing such topics as demographics, daily life, and religious and other beliefs. Health, nutrition, and sanitation are reviewed in chapter six as a way of better understanding local standards of living, while chapter seven discusses how local families make a living through hunting, fishing, the extraction of rubber and Brazil nuts for market sale, horticultural and livestock production, and the manufacture of artesianal items. The above-mentioned chapters provide an understanding of the social and economic lifeway of Antimari. Chapter eight depicts changes in economic externalities that had an effect on that lifeway and the various responses that local families used to adapt. Household case studies are presented to depict variations in adaptation strategy and success. Chapter nine discusses the adaptive responses and their implications for the future of Antimari and for rural extractivists in general.

Notes and Explanations

As it is the responsibility of the anthropologist to protect informants and the information they give about themselves and others, all names of residents and former residents of Antimari are fictitious. The Portuguese language and the spelling of many names have changed over the years to which this research refers and inconsistencies in spelling can occur. Therefore, citations have original spellings and explanations accompany archaic versions of current words and names. Any mistakes in translation are my own as I am solely responsible for errors.

This dissertation was written using an Apple Macintosh Power PC 6100/60 running System 7.6. and printed on an NEC Silentwriter Model 640 laser printer using 12-point Times PostScript font. Field notes were encoded using FileMaker Pro 2.1 v.3. Database management and statistical work was performed using Microsoft Excel 4.0 and SPSS 6.1.1. Graphics were drawn with Superpaint 2.0 and word processing used Microsoft Word 6.0.1.

CHAPTER 2
THEORY AND METHODS

Theory

In the past, anthropological studies did relatively little to describe, much less attempt to understand, the relationships between local communities and larger political and economic entities on the national and international levels of which they were a part. To improve this situation, anthropologists started to expand their fields of inquiry to include these macro-level influences. By the 1950s, anthropological theory consisted mostly of the structural-functionalism of Radcliffe-Brown and Malinowski, cultural and psychological approaches such as those of Mead and Benedict, and human ecology. Human ecology had origins with Childe (1942), Steward (1953a, 1955), and White (1943, 1949, 1959) who had been influenced by Morgan (1879) and Tylor (1865, 1871), as well as to some degree by Marx and Engels (Harris 1968, Ortner 1984). Childe showed that certain technological advances in human history such as the domestication of plants and animals, the adoption of irrigation agriculture, and the invention of metallurgy and writing, had produced dramatic changes in human culture which transformed social, political and economic structures and organization. He postulated that these changes were evolutionary and reflected a progression from hunter-gatherers, through sedentary horticulturalists (Steward 1953b). Steward developed the concept of culture considered according to its level of technology and the particular adaptability of that technology to the environment. Like Steward, White felt that it is the technology of a social system that is mainly responsible for its cultural evolution. He also felt that culture evolves as the amount of energy harnessed per capita per year is increased or as the efficiency of the means of putting the energy to work is increased (White 1949). Because of this stance, White has often been accused of technological determinism. However, he defends his position of the primacy of technology by emphasizing that it is through technology that humans most closely articulate with their environment and it is this component that exerts the greatest causal weight in accounting for cultural evolution (Kaplan and Manners 1972).

White's evolutionism can be classified as universal and contrasted with both 19th century unilinealism, which contended that all cultures have passed through the same stages, and Steward's multilinear model of evolutionism which addresses individual cultures and their environments instead of culture as a singular entity. Steward's multilinear view of culture change distinguished between core and peripheral aspects of culture and emphasized those aspects of culture related to socioeconomic production (Murphy 1977). Steward's and White's broad stages of social complexity and technological advancement (family, tribe, and state) were refined by Service and Sahlins into a standard progression model of bands-tribes-chiefdoms-states (Sahlins and Service 1960, Service 1958, 1962). However, although this human ecological approach has generally emphasized the role of technology and economy in adaptation, these are not the only variables to be considered. Non-technological and non-economic factors such as ideology and sociopolitical changes are also viewed as causal factors in the evolutionary process. However, it is also important to examine a culture's production activities because these are the areas of clearest articulation with the environment (Jochim 1976:9).

Added to this expanded view of factors influencing cultural adaptation is the idea that extra-local, macro-level factors also affect cultures and must be considered when studying culture change. The governing paradigm of capitalist economics is neoclassicism which comes from Adam Smith to Keynes to Samuelson (see Keynes 1936, 1958 and Samuelson

1953, 1958). While neoclassical economic interpretation of change emphasizes micro-level factors, dependency and ecological Marxist approaches emphasize macro-level, external factors that influence local economics (Murdoch 1980, Smith and O'Keef 1980). Marx's economic approach looks at the distribution of material wealth and political power across the socioeconomic classes of society and how households respond to economic change (Plattner 1989:6, Wilk 1990:326). Therefore, Marxist science involves the development of social formations under a general theory of modes of production wherein relations of production are the specific modes of appropriation of surplus labor and the specific form of social distribution of the means of production corresponding to that mode of appropriation of surplus labor. Forces of production refer to the mode of appropriation of resources, i.e. the process by which labor is applied to resources to transform them into objects of consumption. The relations and forces of production combine to form a socioeconomic relationship that depends on the structure of the mode of production as does their accompanying political and ideological structures. (Hindess and Hirst 1975:9-15).

In non-capitalist systems such as Antimari where the primary means of access to factors of production is not via money but where integration into larger market systems has occurred, there are periods of retraction and integration which occur regularly and which are affected by local, national and international factors. This core-periphery interplay has influenced Antimari from the beginning of its non-indigenous habitation and throughout its historical development.

In the dependency model of development, the socioeconomics and future development of an area are linked to and affected by extra-local factors so each is impacted by the world political economy (LaClau 1971:32). Anthropologists started to examine peasants and dependency since the 1970s but did not emphasize how small, remote regions fit into the world economic model. What was needed was a more expansive theoretical framework that integrated political economic and human ecological analysis. Political economic analysis looks at the interacting roles that social institutions at local, regional, national and international levels play in providing constraints and advancements of local resource use. Emphasis is on the impact of these external factors and the ways in which the affected people adapt to them. It ties political economy to human ecology but differs from it in that, while human ecology involves looking at current and historical influences of the natural environment on local human groups, political economy looks at the influences of external political and economic forces on local societies. Hence, it is no longer adequate to view societies as isolated, bounded domains that are unaffected by the outer world. For example, Amazonian communities are coming more into contact with the economies, politics, religions, and cultures of the world through regional and international demands for extracted goods, multinational development projects, the spread of modern culture via radio and television, and the efforts of Christian evangelical movements.

Unfortunately, the Brazilian Amazon has also been the scene of massive and destructive interaction between the demands of the world economy, local cultures, and the natural environment since its initial colonization. As its remote regions are increasingly incorporated into the world economy, they are more affected by it. When the pressures from the world economy become particularly adverse, local people move into a recessionary period, retract their articulations with the market, and diversify household subsistence tactics in an effort to maximize returns on their production inputs given the current economic circumstances. So the nature and intensity of local articulation with extra-local political and economic systems have a great influence on household production strategies. In Antimari, social organization and the culture are best understood through an approach that emphasizes the extractive mode of production and how it is influenced by changes in extra-local economics. A particular feature of extractive economics is that a socio-economic organization which responds to international demand for specific extractive commodities at one point, is likely to lose its utility when the extractive resources are depleted or when demand shifts away from them (Bunker 1982:89). Accordingly, it is important to adopt a research framework which takes these influences into account. Such a far-reaching view is the foundation of the political ecology perspective.

Political ecology embodies the integration of political economy and human ecology in its approach to the interconnectedness of social, economic, and political processes that affect natural resource use (Schmink and Wood 1987, Stonich 1993:25). Whereas, like most of anthropology, human ecology used to be limited to the relationship between a society and its relatively immediate environment, political ecology extends the field of analysis to include more distant perturbations and influences which become increasingly intrusive upon the local lifeways. This integration of ecological and political-economical studies, has become one of the major tools used in understanding culture change and its impact on the environment in many parts of the developing world (see Bunker 1982, Chapman 1989, Moran 1981, Redclift 1987, Schmink and Wood 1987 and 1992, Worsley 1984). Its emphasis on external forces and local adaptation to their influence ties political ecology to human ecology and aids greatly in the study of isolated groups who deal with the larger capitalist world. Furthermore, political ecology, with its emphasis on the importance of history to the study of the contemporary, lends that particular time-depth to human ecology studies.

Methods

This section describes the fieldwork portion of the research and the methodologies employed therein. Much preliminary and *ex post facto* historical and statistical investigation provided background and context for the on-site research but the majority of the fieldwork was conducted between October, 1993 and August, 1994 with on-going observation and some follow-up work by research assistants after this period.

Research objectives called for an analysis of both local production systems and extra-local influences. Thus, the purpose of the methodology was to create an instrument that would generate and integrate accurate information on the past and present lifeway of Antimari with an emphasis on household production strategies as they relate to changes in the external economy. Understanding the diversity of levels of influence affecting any socioeconomic system requires a diversity of information-gathering tools and techniques. The following describes those used during the research.

Site Selection

As the research question focused on how extractivist households adapted to external socioeconomic influences, geographically remote communities experiencing economic change were the most appropriate sites for investigation because they are most severely affected by fluctuations in larger economies. I selected the Antimari area as a research site because the population is geographically isolated with few extra-local contacts but subsists on a production system that has been extremely dependent on the world economy. Antimari's small population (235 people in 1994) afforded close examination of the majority of the households. In addition, it was advantageous that FUNTAC had conducted preliminary socioeconomic studies in the area in years past and had agreed to make these data available for comparison as well as assist with the formidable problem of travel to the site.

Background research. An important part of the study was to examine what people in Antimari were doing before economic changes occurred. The state agency, FUNTAC, was more than generous in providing access to a socioeconomic survey conducted between June and September of 1989 wherein the socioeconomics of 80 area families were qualitatively and quantitatively characterized (FUNTAC 1990b). FUNTAC's survey provided the basis for a comparative study of change over time as I applied the same survey in my own research. FUNTAC also made available their studies of Antimari's flora and fauna and the use of these natural resources by residents.

In addition, I obtained other background information from many secondary sources in and out of the Antimari area. Bibliographic, historical, geographical, environmental, technical, and economic sources included U.S. and Brazilian non-governmental organizations (NGOs); universities in Brazil, England, and the U.S.; private collections, government libraries and archives in Brazil and the U.S.; and private sector agencies in the U.S. and Japan.

Site entry. Another advantage to selecting Antimari as a research site was that two FUNTAC researchers had already established amiable relationships with the local inhabitants and were willing to personally introduce me to individual families and vouch for my benign intentions. In addition, I traveled to the area in a FUNTAC boat piloted by a former Antimari resident who became both guide and friend and whose presence further endorsed my inquiries as nonthreatening.

On-site Data Collection

The research methods that I used to collect on-site information were defined by my objectives and logistical, temporal, and geographical constraints. I traveled within Antimari by dugout canoe and by foot, usually accompanied by a former resident who served as guide. I could not plan interviews and survey applications in advance because there are few means of communication in Antimari and arrival times at colocações depended on terrain and weather conditions that could not be predicted. However, I usually conducted interviews and surveys after evening meals during the quiet time before retiring. Discussions were relaxed and unhurried and enabled my exploration of new ideas and areas of information as well as my cross-checking informants' statements via different approaches to the same questions.

Socioeconomic survey. My initial characterization and identification of the population presently living in the Antimari area was developed via the aforementioned socioeconomic survey wherein information was obtained with respect to income, economic activities, health conditions, education, and quality of life. As stated previously, the survey instrument that was applied for this investigation was a duplication of that which was used by FUNTAC five years earlier, thus creating a longitudinal study of change in the area (see Appendix A). The survey covered most aspect of households' extractive, horticultural and livestock systems and levels of production, but also gathered data regarding household demographics, family migration history, educational and health status, and diet.

A total of 35 families representing all of the occupied colocações of the Antimari area in 1994 were surveyed including many of the same families that appeared in FUNTAC's previous research. With the exception of six households that I did not have the resources to visit personally but which were subsequently surveyed by a research assistant, I surveyed each family while visiting their colocação, a trek which usually involved at least an overnight stay and ample time both to tour the site and to talk extensively with its occupants. In the vast majority of the cases, the eldest working male in the household was regarded as the household head and answered survey questions on behalf of the family. However, in some cases the eldest female held that position. In most families, regardless of which family member began to answer questions, the males deferred to the knowledge of the females regarding demographic, educational, and health-related information while the females relied on the males for providing information about household production. As each readily acknowledged the other's superior grasp of certain aspects of the household, consensus was not a frequent problem.

Participant observation. As quantitative data become meaningful only in the context of a qualitative framework, participant observation augmented surveys and inventories as a strategy to gain a qualitative understanding of issues that relate to household production systems and to get a general feel for life in Antimari. The technique also helped ensure the validity of survey data and reduced the effects of reactivity. The fact that I was in the area for 20 days or so at a time and then returned to Rio Branco for periods of ten days or more was beneficial to the research as I was thus able to maintain a cultural naiveté, minimize the accumulation of assumptions, and not wear out my welcome. Had I not relied on participant observation as a primary research tool, I may have been able to document production adaptations to market fluctuations, but I would not have been able to understand the effects of such changes on households. Most of the time I participated in the lives of local families as an observer. Nevertheless, sometimes the participation part of my role as researcher superseded the observational part. I hunted and fished with residents, trekked the forest and paddled the river with them, and slept and ate in their homes. I also "participated" in a boat sinking, an earthquake, a few of the local diseases, and hunger when food was scarce. But living with families in Antimari also meant that I could participate in their lives by giving what medical aid I could as partial repayment for peoples' hospitality and their patience with my endless stream of questions.

Interviews. One of the best ways to find out what is happening in a community and how local people are affected is to ask them. I conducted household-level, semi-structured interviews with residents, former residents and former traders of Antimari in the Antimari area, in a homesteading settlement, on ranches, and in the city of Rio Branco. In addition, I repeatedly held informal and unstructured interviews with key informants in Antimari. I used snowball sampling to find out-migrants by asking Antimari residents to provide names and locations of people who had left Antimari. This technique is most useful for small, difficult to find samples, especially urban migrants from rural groups such as ex-residents of Antimari (Bernard 1995:94). I also held semistructured interviews with representatives of NGOs as well as government officials and leaders of both the Catholic and the Assembly of God churches in Rio Branco in order to gain background information. These interviews helped guide further inquiry, confirmed or refuted my impressions, and helped paint a picture of past as well as present life in Antimari in a way that surveys and other qualitative instruments could not.

Case studies. As illustrations of real-world examples of adaptive socioeconomic strategies, I documented case studies both within Antimari and among ex-residents through participant observation and interviews.

Data recording. I took few notes while conducting interviews as I felt that using pen and paper both made the interviewees uneasy and directed their attention, as well as those of observers, away from the conversation and toward the mechanics of writing. Instead, I hastily jotted sketchy notes in private as soon as possible after interviews. I then expanded these notes in fieldwork notebooks on a daily basis. At the conclusion of the fieldwork portion of the research, I coded the information contained in the notebooks in accordance with the coding delineated in the Outline of Cultural Materials (see Murdock *et al.* 1961). I then indexed these coded data in a computer database using Claris Corporation's program, FileMaker Pro 2.1v. 3.0, in order to provide organization and accessibility.

Analysis of Information

There are no societies in which households are totally isolated and self-sufficient as they are always connected to and affected by larger economic forces (Laslett 1984, Sahlins 1972, Wilk 1990). Therefore, changes in the socioeconomics of Antimari are best understood by examining not only local production systems but the externalities to which they must adapt. For that reason, I analyzed causes and effects regarding local socioeconomics on the following levels:

- Macro Level - Economic inflation rates and demand and market prices for natural latex.
- Middle Level - Market prices and demand for natural latex and Brazil nuts in the state of Acre, Brazil.
- Micro Level - Household production strategies of Antimari residents and out-migrants.

Nevertheless, households remained my main focus of inquiry. Research on the household level is well-suited to the study of economics of production in the Amazon because there the household is the primary unit of production as well as the primary unit of consumption, the primary unit of labor, and the primary social unit. (Schmink 1984). As such, it is the household that responds to changing socioeconomic and environmental realities. In addition, focusing on the household also bridges the gap between individual economic decision making and larger theories of political economy and puts them in a socio-economic context (Schmink 1984). A focus on household production systems also provides insight into local socioeconomics, the importance of domestic and extra-local capital and the degree of articulation with markets as well as the role of local, regional and extra-regional political economies. As stated earlier, some preliminary socioeconomic data had been previously collected in Antimari, primarily by FUNTAC. However, this research was the first extensive fieldwork on household socioeconomics that lent anthropological methods such as participant observation and interviews to the problems of socioeconomic change in the area.

CHAPTER 3
PHYSICAL SETTING OF ANTIMARI

The Antimari area lies within the Brazilian state of Acre which is located on that country's border with Bolivia and Peru (see Figure 3.1). With a population of only 437,419 people, over half of whom live in urban centers, Acre encompasses an area of 152,589 square kilometers (58,915 square miles), 94 percent of which remains tropical rainforest (SEPLAN 1993).[1] Nearly one-hundred years ago, Brazilian author Euclides da Cunha, called the region, "the last page of Genesis" and Leandro Tocantins wrote that in Acre, "nature appears still wet from the last brush strokes of creation" (Cunha 1902, Tocantins 1978:89). Today, Acre is becoming increasingly important in the geoeconomic and geopolitical complex of both Brazil and South America as it is destined to play an ever-growing role as a conduit for the exportation of Brazilian goods to Asia and the west coast of the United States through its development of international trucking routes.

The extraction of forest products, especially rubber, was the principal economic activity in the Acre region for thousands of migrants from Brazil's Northeast who went into the Amazon basin to escape drought and economic crisis toward the end of the last century. For over 100 years thereafter, extraction was practically its sole economic activity. Brazil nut and rubber harvesting, along with some timber production, still constitute the principal economic activities. Even a decline in rubber prices and a reduction in production caused by the closure of many rubber estates in the 1980s and 1990s have not forced the rubber industry from its position of supremacy in Acre's economy.

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[1] Acre comprises an area of tropical rainforest roughly equivalent in size to Nepal or Bangladesh.

Subsistence horticulture dominates regional farming but some crops such as manioc, rice, bananas, and maize are sold in local markets. Statewide livestock production consists

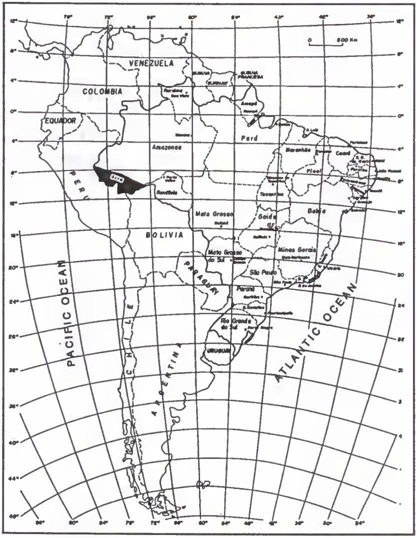

Figure 3.1 Location of the Brazilian state of Acre.

of approximately 410,000 head of cattle, 1,722,000 pigs, and 26,000 sheep (Editora Abril 1995). Acre also supports a limited number of small industries devoted to timber, furniture production, and ceramics. However, despite heavy government subsidies for other activities such as large-scale agriculture and livestock raising in the 1990s, they have failed to reach the production levels of rubber and Brazil nuts in Acre. In addition, a large part of Acre's infrastructure and economy still relies on provisioning Brazilians and over 8,400 indigenous people who are engaged in extractive activities in the region's forests. These rural peoples' socioeconomic strategy of combining subsistence horticulture with the extraction and sale of local resources, chiefly rubber and Brazil nuts, fulfills the majority of their basic needs with products from the forest (game, fish, fruit, medicinals, and artifact materials) and from crops (fruits, vegetables, and tubers) in a system which is highly adapted to the local tropical rainforest ecology and results in only minimal damage to the environment. In addition, their extractive activities provide them with commodities that they can exchange for essential industrialized goods such as clothing, medicines, tools, and hunting and fishing equipment. However, recent declines in the value of natural rubber on world markets, coupled with economic hyperinflation and the reduction of governmental price supports, have strained rural peoples' ability to maintain their traditional lifeway.

Location of Antimari

The Antimari area described in this dissertation lies within the upper Purus River basin in a 661 square kilometer (255 square mile) region of the state of Acre approximately 105 kilometers (62 miles) northwest of the city of Rio Branco. Located between the parallels 09°, 10" and 09°, 32" South and between the meridians 68°, 01" and 68°, 22" West, the area is a part of the District of Bujarí which separated from the District of Rio Branco in

1993. Divided by the Antimari River, a tributary to the Rio Acre, the area also shares a border with the Brazilian state of Amazonas (see Figure 3.2).

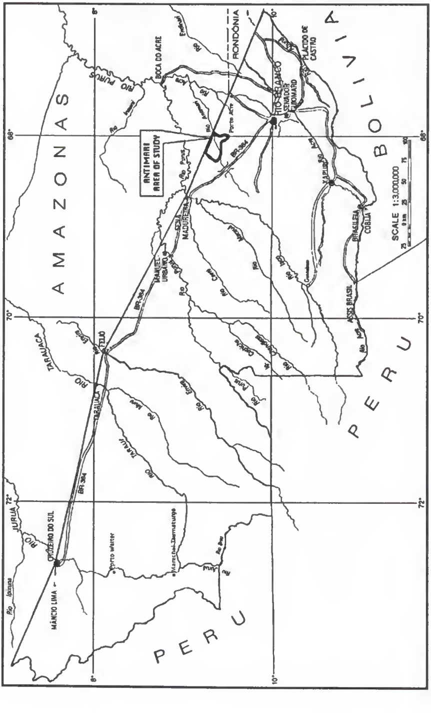

Figure 3.2 Location of Antimari

Access. As there are no roads to or within the Antimari area, it can be reached only by water. During the dry season, one can travel 86 kilometers (53.8 miles) northwest of Rio Branco by four-wheel-drive vehicle or large truck on the dirt road designated BR-364 to where it passes over the Antimari river via a single-track, wooden bridge. At this point one must leave the road and continue by water. Under optimal conditions, descending the Antimari river from this point using a 22-foot aluminum boat with a 25 horse-power motor, one can reach the Antimari area in less than one day. However, for almost half of each year, heavy rains render the BR-364 road impassable and one can only reach the Antimari river by descending the Acre river from the city of Rio Branco until reaching its confluence with the Antimari river. Then one must ascend Antimari river until reaching its inhabited area (see Figure 3.2). This 276-kilometer (171-mile) journey requires three and a half days by boat with motor. However, all but two families in Antimari have only dugout canoes.[2] Thus, for local residents the same trip requires up to ten days to accomplish by paddle.

Physical Characteristics of the Antimari Area

As traditional people such as those who reside in Antimari live in geological and ecological contexts that have great influence on their way of life, it is appropriate to consider the physical environment in anthropological studies.

Climate

Climate is of primary importance to hunter-gatherers and horticultural people such as Antimari's population who depend directly on natural resources for their support as it affects the soils, flora and fauna on which they depend. Antimari's climate can be described as hot and humid with abundant rain and a dry season that is not strong enough nor long enough to impair local forest vegetation (FUNTAC 1990a). It has a Köppen classification of AM, meaning a hot and humid monsoon climate with a short dry season, and possesses characteristics which place it between climates classified as AF (superhumid without dry a period) and AW (tropical-humid with a rainy period in summer and dry period in winter) (Aherns 1985:468-469, Guerra 1955:57-61).

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[2] Local canoes are adaptations of the indigenous *ubá* (Tocantins 1984:32).

Temperature and humidity. The average annual temperature of Antimari is 25.3°C. (77° F.) (s=8.4° C. (15° F.)) (SEPLAN 1986, 1990, 1993). Between 1990 and 1992 the average temperature of the hottest month, October, was 26.7° C. (80.06° F.) while the average temperature of the coolest month, July, was 23.3° C. (73.94° F.) (IBGE 1994). The highest temperature ever recorded at nearby Sena Madureira was 38.8°C. (101.84° F.) occurring on October 6th, 1936 (Tocantins 1984:31). Relative humidity ranges from 82 to 86 percent with an average of 83 percent (SEPLAN 1993:16) (see Table 3.1).

Friagem. Almost every year, usually in August or September but sometimes as early as May, a strong displacement of cold air masses from the Antarctic causes temperatures in the Acre region, including Antimari, to drop below 15° C. (59° F.) for a period of hours or days. Known locally as a *friagem*, temperatures have been known to drop as low as 7.9° C. (45.1° F.) and kill some forest animals and vegetation despite the extremely short duration of these cold snaps (Guerra 1955:53, Tocantins 1984:31).

Rainfall. Precipitation in the Antimari region averages approximately 2,070 mm. (81.4 inches) per year with a standard deviation of only 19.46 mm. (0.77 inches) (IMAC 1991:14, 29 SEPLAN 1986, 1990, 1993). The rainy season lasts from seven to nine months and the dry season is approximately 20 to 40 days in duration. Precipitation in the most humid month, January, averages 312 mm. (12.3 inches) while rainfall in the driest month, July, averages only 19 mm. (0.75 inches). The result is a rain deficit from May to September and an excess from November to April (FUNTAC 1991a:17-19).

Hydrology

The Antimari River. The Antimari River originates 105 kilometers (65.2 miles) west-northwest of the city of Rio Branco, Acre at an altitude of approximately 160 meters (480 feet) above sea level despite being well over 2,000 kilometers (1,250 miles) upstream from the mouth of the Amazon River (FUNTAC 1991a). From there it flows northeast to where it empties into the Rio Acre, a distance of 187 kilometers (116 miles). The approximately 63 kilometer (39 mile) length which runs through the area of this study has a sinuosity index of 2.1 which characterizes it as meandering (FUNTAC 1989a, 1991a). Indeed, local residents measure distance on the river, not by kilometers or time traveled, but by how many bends in the river one has traversed. Although sometimes deep enough to support shallow-draft boats over ten meters in length, the river is navigable year round only to dugout canoes.

Watersheds. As part of the Purus river system, the Antimari area has 19 watersheds of the fourth, fifth and sixth order covering over 50,108 hectares, plus 17 watersheds of the third order and 12 of the second order (FUNTAC 1991a). They are not highly subject to flooding due to a relatively short length of superficial runoff and a low average base flow (FUNTAC 1991a). However, the area's ample drainage affects soil characteristics such as hydraulic conductivity and moisture content, and causes rapid changes in the level of the Antimari river leading to periods of either low water or flooding (FUNTAC 1990b, Guerra 1955:57-61, Tocantins 1984). Most of the streams draining the Antimari area and feeding the Rio Antimari have large amounts of water during the rainy season but remain empty during the dry season. These dramatic changes in river levels are typical of the Acre region. For example, the level of the Rio Acre at the city of Rio Branco can rise and fall as much as 25 meters (Sternberg 1975:50). River outflow at the mouth of the Antimari River is only 4.80 cubic meters per second during low flow but can rise to more then seven cubic meters per second in only a few days (FUNTAC 1991a).

Table 3.1. Temperature, Precipitation, Humidity and Insolation in Rio Branco, Acre, Brazil, 1983 - 1990.

	Temperature				Precipitation				
	Average High	Absolute High	Average Low	Absolute Low	Total Annual	Maximum in in 24 hour period		Relative Humidity	Insolation (in hours
Year	(in °C.)	(in °C.)	(in °C.)	(in °C.)	(in mm)	(in mm)	Date	(in %)	per year)
1983	32.0	38.2	20.3	12.8	1707.3	95.20	16/01	83	1557.8
1984	32.0	35.8	19.9	09.0	2050.2	77.60	17/01	83	1563.5
1985	31.0	35.6	20.3	07.8	2105.0	129.20	19/04	85	731.0
1986	31.4	36.4	20.5	12.4	2383.2	102.20	11/10	86	1314.6
1987	32.1	37.6	19.8	11.2	1712.1	not avail.	not avail.	82	1645.8
1988	29.0	37.5	19.2	08.4	2353.1	107.60	29/12	83	1585.4
1989	31.4	37.0	17.8	07.4	2216.2	75.60	18/01	84	1544.5
1990	31.2	36.8	16.7	08.2	2040.0	80.40	24/12	83	1866.9
Mean	31.263	36.863	19.313	09.650	2070.9	95.40		83.625	1476.2
S.Dev	01.001	00.902	01.366	02.153	256.8	19.46		1.302	336.7

(adapted from SEPLAN 1986, 1990, 1993)

Topography

The Antimari area exhibits great topographic diversity ranging from level, through smoothly rolling, to strongly undulating terrain. However, the general topological relief is slightly undulating in most parts with some locally steep inclines of short duration. *Terra* *firme* or land that is never covered by water, predominates (91.94 percent) with *várzea* or periodically flooded forest, swamp, and river constituting the remaining area (FUNTAC 1990c).

Soils. In general, soils consist of clay to a depth of more than 100 centimeters. The principal soil types are red-yellow podzols (34.84 percent and mostly in terra firme), dark red podzols (30.82 percent), and plinthosols (24.60 percent). Low humic gley (6.14 percent and mostly in várzea) and red-yellow latosols (0.60 percent) are also represented (Pereira *et al.* 1991). A study of one of the largest watersheds in the Antimari area, 351.33 hectares (868.14 acres), revealed a soil compactness index of 1.27 (FUNTAC 1991a). Chemical characteristics include a high aluminum saturation which contributes to low fertility. Moreover, as they are desiccated, compacted, and broken by fissures in the dry season many of the soils also show high mechanical activity indicating poor physical characteristics and composition. Combined with the undulating topography, this action leaves some areas susceptible to erosion when ground cover is removed (FUNTAC 1989a:40, 1991).

Flora

Because, like climate and topography, the biosystem in which a human population exists is also an active constituent in the matrix of forces to which they must adapt, it is important to understand its constituents, the limitations they impose, and the opportunities they provide. The region that is now the state of Acre is the only area of the Amazon basin that, except for its rivers and lakes, was 100 percent forest cover when the first Brazilians arrived (Castelo Branco 1961). Even as late as 1990 the state had lost only five percent of its rainforest. This fact that the region is even less disturbed than that of other areas, combined with the area's difficult access and sparse historical use for agriculture or livestock, makes Antimari an appropriate site for an ecological reserve or conservation area.

Forest Typology

According to the Remote Sensing Laboratory of the Fundação de Tecnologia do Estado do Acre (FUNTAC), the Antimari area contains four different types of forest occurring in the following distribution (FUNTAC 1990b:10):

Open broadleaf forest with bamboo. This type of forest encompasses approximately 37 percent of the area and contains many trees over one meter diameter at breast height (DBH). The bamboo is called *sete-camas* or seven layers because as it dies and falls it forms many layers on the forest floor. The bamboo is so dense in some places that passage by humans is impossible.

Open semi-dense broadleaf forest with bamboo. Approximately 32 percent of the area is comprised of this type of forest which contains bamboo dominated by branching trees. However, because it is flooded during the rainy season bamboo is absent from the lowest lying areas.

Dense broadleaf forest with bamboo. This type of forest accounts for approximately 17 percent of the area but is found only in the extreme northwestern part of Antimari. Bamboo is hampered in this zone by the dense forest canopy which restricts sunlight. The most prevalent species of bamboo found in the area is (*Guadua Weberbaueri pliger*), a species that has not been identified elsewhere (FUNTAC 1989a:51). It is small in diameter, thorny and is suitable for neither pole stock, fencing nor construction material. Other species represented are (*Bambusa sp.*), (*Pouteria spp.*), and (*Cariniana sp.*).

Dense broadleaf forest with uniform canopy. Approximately 14 percent of the area exhibits this type of forest which occurs principally along the banks of the Rio Antimari. These are swampy or periodically flooded sections of forest where the understory is open enough to permit human passage with relative ease. Density varies from a complete absence in some areas to a maximum of 2,800 individuals per hectare in others (FUNTAC 1989a:41).

Anthropic areas. Anthropic areas are areas of human disturbance, usually at homesites, and generally consist of trails, forest clearings for houses and their immediate surroundings, horticultural plots and, in a few instances, small pastures. Surveys revealed that there was a total of 91 homesites in the Antimari area in 1994, all of which contain areas where forest has been cleared to some degree but anthropic areas still constitute only approximately 0.60 percent of the Antimari area.

Ethnotypology

As culture is what mediates the relationship between humans and their surroundings, people name and categorize their environment. In the past, ethnotypology as been de-emphasized but a new appreciation has recently emerged as researchers and scholars acknowledge the value of the emic understanding of the relationship between a people and the physical world in which they live.

Ethnotypology of the forest. Local residents refer to as *restinga* regions of vegetation less than three meters high with little bamboo and which are flooded only by the largest floods. However, forests of dense bamboo with a closed understory that is rarely flooded are called *tabocal*, while a succession of closed understory vegetation on flood-free land which occurs in forest areas used for horticulture is referred to as *capoeira*. The latter is in contrast to swampy areas of forest that are flooded by slow streams termed *igapós*. These distinctions are in addition to the previously mentioned ethno-classification of land that is never flooded and has an understory that is generally sparse but dense in some areas called terra firme and areas seasonally flooded by the main river called várzea. All of these areas are used as resources for fruits, medicinals, extractives and game.

Ethnotypology of anthropic disturbance. In Antimari, all trails through the rainforest are not the same to local inhabitants. Ethnotypology reveals three separate classifications of trails, each with discrete characteristics and purposes. Almost the entire region of Antimari, especially homesites, can be accessed by these paths which are locally classified as *varações, varadouros*, and *estradas de seringa*. Accordingly, the ethnotypology of anthropic areas is as follows:

Colocações. This is a region of forest demarcated by the rubber trails that are usually worked by a single family. It typically consists of a dwelling or sometimes two, a horticultural plot and the forest lying within and between its rubber tails. The average size of colocações (the plural form of the word colocação) in Antimari is approximately 300 hectares. Actual anthropic disturbance within a colocação is usually limited to foot paths, the horticultural plot, and the yard immediately surrounding the dwelling (see Figure 3.3).

Varações. As trails which serve as connections between colocações in a given area they are least traveled, least maintained, and provide the most risk of a traveler getting lost in the rainforest.

Varadouros. These are trails that are large enough to permit passage by humans and cargo animals such as burros. Used for transporting extracted products and locally produced agricultural products, they are the principal connections between the colocações of a given area and a centralized point of trade on the riverbank. They are generally straight and are transversed by rubber trails (*estradas de seringa*).

Estradas de seringa. Colocações contain rubber trails, called estradas de seringa, which are narrower and not as well maintained as the better-traveled varadouros but are generally more passable than *varações*. Estradas de seringa are smaller paths which permit human access to rubber trees in the rainforest but do not permit the passage of burden-carrying animals. As it is advantageous for the rubber tappers to end their daily tapping at their dwelling, these trails are generally laid in loops which have their start and finish either near the individual *colocações'* homesites or close to one another on varadouros. Unlike varadouros which extend between and sometimes through colocações, the extension and general distribution of a colocação's estradas de seringa generally demarcate its boundaries (see Figure 3.3).

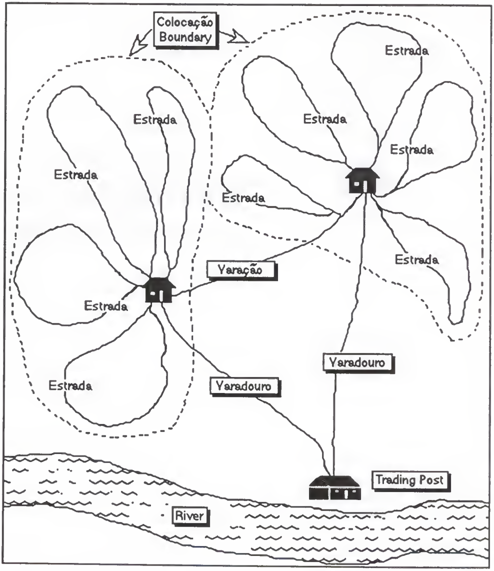

Figure 3.3. Ethnotypology of Rubber Tapping Areas.

Although appearing relatively similar to the outsider, to the people who depend on them the characteristics of each type of trail are so distinct that experienced foresters can discern the purpose for which any trail was made and where it leads just by walking on it for a few meters. It should be noted that Antimari's residents are well-acquainted with traditional life in the rainforest. Demographic inquiry revealed that 27.8 percent of local household heads and their spouses were born in Antimari and some had lived there for as long as 66 years. Another 60.8 percent were born in traditional colocações in the state of Acre or the neighboring state of Amazonas. Therefore, at least 88.6 percent of Antimari's household heads and their spouses were born into and reared in the extractivist lifeway and its physical environment.[3]

Local Floral Species

Of the 625 plants identified in a FUNTAC survey of the Antimari area, 361 were trees, 18 were palms and the rest were vines and ground plants (FUNTAC 1989a:29). The floral families representing the greatest number of species were Caesalpiniacea (46 species), Mimosacea (31 species), Moraceae (30 species), Fabceae (28 species), and Euphorbiaceae (28 species). However, among others, representatives of the following species also reach a diameter of over one meter diameter at breast height (DBH) with an average forest density of 114.5 trees per hectare (46.34 trees per acre) (Cavalcanti 1990b:15, FUNTAC 1989a:39, 1990b:9):

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[3] Among Antimari residents surveyed, 5.1 percent did not know where they were born but, as they knew they were not reared in an urban enviornment, they assumed that they too were born in a colocação like Antimari. Adding this 5.1 percent to the percent of those surveyed who were sure they were born in a colocação would bring the percent of Antimari household heads and their spouses who had been intimately familiar with the extractivist lifeway and physical environment to 93.7 percent.

Aguano or Mahogany (*Swietenia macrophylla*)
Carapanaúba (*Aspidosperma spp.*)
Cardeiro or Cedar (*Scleronema micranthum*)
Copaíba (*Macrolobium microcalyx*)
Cumarú de Cheiro or Cerejeira (*Dipteryx punctate*)
Jatobá (*Hymenaea courbaril*)
Maçaranduba (*Manikara amazonica*)
Sumaúma (*Cochlospermum orinoccense*)

In the dense, open forest on the river's flood area, the following represents the most frequently found plant species:

Açaí (*Euterpe oleraceae*)
Envira Ferro (*Xylopia brasiliensis*)
Ingá (*Inga spp.*)
Jaci (*Jessenia sp.*)
Paima (*Perebea spp.*)
Seringa (*Hevea sp.*)

Where bamboo is not dominant there is dense forest with relatively open sub-regions with vegetation up to only three meters. The following are the most frequently found species occurring principally along the interfluves of the left bank of the Rio Antimari:

Breu (*Protium spp.*)
Cajara (*Spondias lutea*)
Jaracatiara (*Jaracatea sp.*)
Pau-d'-arco (*Tabebuia spp.*)

Species Exploited by Residents

In 1989, FUNTAC conducted an ethnobotanical study of the Antimari area in which information on plant ethnotypology and use were obtained by interviewing local rubber tappers (FUNTAC 1989a:11-12, 1991c). Of 1,244 species identified in the study, 674 were designated by local informants as being useful.

Rubber trees. The rubber tree (*Hevea brasiliensis*) is the species most exploited in Antimari and forms the foundation of the area's economy. A total of 544 rubber trails have been established in the area's colocações with the number of rubber trails averaging 5.67 per colocação with a maximum number of fifteen and a minimum of two. However, 50 percent of the rubber trees above 20 cm DBH found in the area have never been exploited for latex (FUNTAC 1989a:30).

Brazil nut trees. Brazil nut trees (*Bertholletia excelsa*) do not occur homogeneously throughout the region. Known locally as *castanha do Pará*, they are found only on terra firme and rarely on the left bank of the Antimari river (IBGE 1990). Moreover, there are colocações where there are no such trees and others where the entire nut harvest is only sufficient for domestic consumption. The area's rubber trails access over 6,600 Brazil nut trees. However, only about 77.6 percent (5,082) were being exploited in 1994.

It should be kept in mind that, aside from two fugitives who reside in Antimari in order to take advantage of its of remote location and difficult access to avoid notice by legal authorities, the reason that people lived there was to tap rubber trees and collect Brazil nuts and it was around these two activities that Antimari's extractive lifeway evolved. Moreover, it was the pursuit of these two forest products that induced residents to open new colocações ever-farther from the Antimari river.

Areas nearer the river contain fewer Brazil nut trees and game is less prevalent there than in the interior. But the river itself is a source of transportation, articulation with the larger world, and reliable fishing for dietary protein. It is also along the riverbank that the trading posts, schools, health posts, and the majority of the population are located.

The terra firme of Antimari's interior harbors a more dense rubber tree population and offers better subsistence hunting than the lower areas near the river. However, there is little opportunity for relying on fishing for food and families live in extreme isolation. Travel to the facilities or colocações located along the riverbank requires hours of trekking through the forest over almost invisible paths carrying on one's back either 60 kilogram (132.2 pound) loads of Brazil nuts or rubber for trade, or a sick or injured child in need of medical care. The extreme isolation also means that children in the interior cannot possibly attend one of the three schools that periodically operate along the more densely populated riverbank. Therefore, there are advantages and disadvantages to the location of any colocação in Antimari and residents choose to live either along the riverbank or in the interior according to their production focus as well as what land is available. Most of the oldest colocações were established well over fifty years ago along the riverbank and most have been continually occupied--sometimes by the same family for generations. Colocações in the interior are generally newer, having been opened by newcomers or residents born in Antimari who are now starting their own families. But in recent years, more and more of the colocações in the interior have been abandoned as the demand for the superior amount of rubber and Brazil nuts that these remote sites can produce diminished to the point that it was outweighed by the less harsh, less solitary life offered by the riverbank. This is an example of how economic externalities, in this case the international demand for rubber and Brazil nuts, can affect even the settlement pattern of a remote area such as Antimari.

Other floral resources. The local forest provides fruits, nuts, fuelwood, construction material, and other non-timber products such as medicinals and honey. It also provides habitat and food for game species upon which local residents depend heavily for animal protein. Housing material for flooring, walls and roof consists principally of split paxiúba (*Socratea exorrhiza*) trees for the walls and leaves of jarina (*Phytelephas macrocarpa*), patauá (*Jessenia bataua*) and urucuri (*Scheelea martiana*) palms are primarily used for roofing material. Wood from the yellow guariúba (*Clarisia racemosa*) and arapari

(*Macrolobium acaciifolium*) are used for water craft and envira fofa (*Guatteria discolor*) and matá-matá (Lecythidceae) are used for making ropes and cordage as these species yield long, strong fibers (FUNTAC 1991b:24). The 1989 FUNTAC study found only one unidentified shrub that is used to make violet dye. However, further investigation for this dissertation also revealed that colorau (*Bixa orlleana*), found principally on river banks but also grown in home gardens, was used as a food coloring, cosmetic, and insect repellent. Interestingly, the timbó vine (Derris), the pulp of which is typically placed in small bodies of water to stun fish for harvest as a protein source, was not identified by local informants as a piscicide but as a decorative used for personal adornment. Fuelwoods mentioned by local informants included woods selected for specific burning characteristics but species selection was more important in the past when latex tapped from local trees was cured by smoking over wood fires (FUNTAC 1991b:25). This extensive use of naturally occurring flora further demonstrates the dependence of residents on their environment and the adaptive use of local materials, some of which may have potential as marketable nontimber forest products.

Fauna

Antimari's rich and relatively undisturbed flora supports an array of terrestrial, avian, and riverine faunal species rarely encountered even in other Amazonian rainforest regions. Table 3.2 indexes some of the principal species found in Antimari. Conspicuous by its complete absence is the white-lipped peccary (*Tayassu pecari*). In addition, the black spider monkey (*Ateles paniscus*) is present in notably decreased numbers. Both species are extremely sensitive to hunting pressure (FUNTAC 1990a:7).

Although most own some chickens, ducks and an occasional pig, all families in the Antimari area rely heavily on hunting and fishing of local wild fauna for their dietary protein with fish and game accounting for 64.3 percent of all foods served at meals divided among fish (22.9 percent), deer (14.5 percent), wild pig (6.4 percent) and others (FUNTAC 1990a:7, Martins n.d.:28). As and example, Table 3.3 portrays game taken by Antimari residents in a single year.

Fish

Fish represent 22.9 percent of game consumed in Antimari with a variety of species found in over 20 percent of meals surveyed (FUNTAC 1990a:12). Table 3.4 records some of the species most frequently consumed. Hooks and lines are the most frequently used fishing technology. Nets are acknowledged to be more efficient and are sometimes employed in the Rio Antimari, but their cost is prohibitive for most residents. Over 59 percent of residents interviewed in 1989 claimed that they fished twelve or more times per week. While 27 percent fished at their riverbank colocação, another 40.3 percent fished less than 30 minutes from their colocações (FUNTAC 1990b:27).

Land Appropriation, Tenure, and Resource Access

Land Appropriation

Much as the family farm is the basic physical unit of production in many agricultural regions, the *colocação* is the basic physical unit of production in the traditional extractive production system of Antimari. Historically, a *colocação* was a geographic subdivision of a *seringal* or rubber estate encompassing a number of rubber trails that were to be worked by one or more rubber tappers. Today, the geography of Antimari's colocações remains

Table 3.2. Principal Terrestrial, Avian, and Riverine Faunal Species

English Name	Local Name (in Portuguese)	Scientific Name
Anteater	Tamandua bandeira	*Myrmecophaga tridactyla*
Bird	Bacurau	*Nyctiphrynus ocellatus*
Bird	Inhambu	*Crypturus strigulosus*
Bird	Maguari	*Cicconia maguari*
Black caiman	Jacaré-açu	*Melanosuchus niger*
Black spider monkey	Coatá	*Ateles paniscus*
Boa constrictor	Jibóia	*Constrictor constrictor*
Brown capuchin monkey	Macaco prego	*Cebus apella*
Caiman	Jacarétinga	*Caiman crocodilus*
Capybara	Capivara	*Hydrochoerus hydrochaeris*
Collared anteater	Mambira	*Tamandua tetradactyla*
Collared peccary	Caitetu	*Tayassu tajacu*
Common squirrel monkey	Macaco cheiro	*Saimiri sciureus*
Common woolly monkey	Macaco barrigudo	*Lagothrix lagothricha*
Curassow	Mutum	*Mitu mitu*
Deer	Veado	*Mazama spp.*
Duck	Pato-do-mato	*Cairina moschata*
Falcon	Cãcã-de-fogo	*Daptrius americanus*
Forest cats	Gatos do mato	*Felis spp.*
Harpy eagle	Gavião real	*Harpya harpyja*
Jaguar	Onça pintada	*Panthera onca*
Kngfisher	Martín pescador	*Unknown*
Manatee	Pexie-boi	*Trichechus inunguis*
Night monkey	Macaco-da-noite	*Aotus spp.*
Nine-banded armadillo	Tatu-galinha	*Daysaspus novemcinctus*
Opossum	Mucura	*Didelphis spp.*
Paca	Paca	*Agouti paca*
Parrot	Aracuã	*Ortalis motmot*
Partridge	Uru	*Odontophorus gujanenisi*
Pink dolphin	Boto rosa	*Inia geoffrensis*
Pit viper	Cobra papagaio	*Cophias bilineatus*
Puma	Onça vermelha	*Felis concolor*
Red howler monkey	Macaco guariba	*Alouatta senculus*
Red-rumped agouti	Cutia	*Dasyprocta aguti*
River dolphin	Tucuxi	*Sotalia fluviatilis*
River turtle	Tartaruga	*Podocnemis expansa*
Sloth	Preguiça	*Bradypus spp.*
South American coati	Coatí	*Nasua nasua*
Stork	Jaburu	*Jabiru mycteria*
Tapir	Anta	*Tapirus terrestris*
Tortoise	Jabuti	*Geochelone denticulata*

Table 3.3. Game Taken in One Year by 25 Randomly Sampled Families in Antimari

English Name	Scientific Name	Average Number of Individuals Taken per Household	Number of Households Reporting Successful Hunt	Maximum Number of Individuals Taken per Household	Minimum Number of Individuals Taken per Household	Std. Dev.	Total Number of Individuals Taken
Armadillo	*Priodontes maximus*	5.83	48	30	1	6.23	280
Capibara	*Hydrochoerus hydrochaeris*	3	9	10	1	2.79	27
Deer	*Mazama spp.*	7.7	60	53	1	8.71	462
Guan	*Penelope sp.*	6.96	51	30	1	5.31	355
Monkey	*Cebus apella*	6.24	33	20	1	5.72	206
Tinamou	*Crypturellus sp.*	11.26	66	80	1	11.92	743
Paca	*Agouti paca*	8.12	54	30	1	7.94	442
Tortoise	*Geochelone denticulata*	13.6	57	60	1	13.33	775
Peccary	*Tayassu tajacu*	7.68	59	50	1	8.62	453
Misc.		21.5	54	60	1	12.14	942

(adapted from FUNTAC 1990b)

unchanged but tenure has moved from the traditional estate owner, called a *patrão*, to the resident family.

The Antimari area is legally classified as an *Unidade Productiva* or productive unit, and thus holds no special status as a reserve or conservation area (Arcângelo 1994). In Antimari, land is appropriated more by *de facto* possession than by *de jure* ownership. Legal ownership of the rubber estates that made up the Antimari area was abandoned by their registered owners when the buying and transport of rubber from Antimari to urban markets became decreasingly lucrative. The land was then appropriated by the individual families who lived on its colocações and it is they alone who determine how local resources are exploited. Occupants of the seringais' individual colocações now enjoy full, heritable usufruct rights. In Antimari, abandoned colocações and previously unoccupied land can be appropriated by both local residents and in-migrants through their physical occupation of the area. If a family can prove that they have lived uncontested at a colocação for over five years and have improved the land in some way, they are then entitled to certain rights under Brazilian squatter's laws including the right to remain on the land, use its resources, and

Table 3.4. Principal Piscine Species Consumed in Antimari

English Name	Local Name (in Portuguese)	Scientific Name
Catfish	Tamoatá	*Hoplosternum sp.*
Catfish	Mandi Mole	*Pimelodella cristata*
Characin	Branquinha	*Curimta latior*
Characin	Sardinha	*Triportheus sp.*
Cichlid	Cará	*Cichlasoma sp.*
Eel	Muçum	*Symbranchus marmoratus*
Mud Characin	Traíra	*Hoplias malabaricus*
Not identified	Aruanã	*Osteoglossum sp.*
Not identified	Barba Chata	*Pirinampus pirinampu*
Not identified	Bico da Pato	*Hemisorubim sp.*
Not identified	Cachorro do Padre	*Parauchenipterus sp.*
Not identified	Caruaçu	*Astronotus ocellatus*
Not identified	Cascuda	*Semaprochilodus bama*
Not identified	Curimatã	*Prochilodus sp.*
Not identified	Jacundá	*Crenicichla sp.*
Not identified	Jeju	*Erythrinus sp.*
Not identified	Mandubé	*Ageneiosus brevilis*
Not identified	Pescado	*Plagioscion sp.*
Not identified	Piaba	*Brycon spp.*
Not identified	Piau	*Leporinus spp.*
Pacu	Pirapitinga	*Colossoma sp.*
Painted Catfish	Surubim Pintado	*Pseudoplatystoma fasciata*
Peacock Bass	Tucunaré	*Cichla ocellaris*
Piranha	Piranha	*Serrasalmus spp.*
Sailfin Pleco	Braço da Moça	*Plastystomatichthys sp.*
Shovel Nosed Catfish	Surubim	*Pseudoplatystoma sp.*
Silver Dollar	Pacu	*Myleus spp.*
Spotted Catfish	Mandi	*Pimelodus blochi*
Striped Pleco	Bodó	*Hemiancistrus spp.*

(adapted from FUNTAC 1990a)

pass on the legal status to relatives. Legal rights turn into legal ownership even though ownership is not legally registered and colocações are not legally demarcated. However, squatters rights do not include clear title to the land as it is usually legally owned by an absentee who holds registered, legal title. Despite their right to modify their land in any way and to sell it if they so desire, neither they nor the buyers can legally evict families with squatters' status. But in Antimari, as in many frontier regions, there is sometimes a wide disparity between what is legal and what actually occurs. Rural people, some with legal documentation attesting to their status as squatters, are frequently evicted from their colocações by legal owners or by others who merely want to exploit local resources. What local people call the *Lei .44*, or the law of the .44 caliber rifle, still takes precedence over paper documents in areas such as Antimari where enforcement of legislative laws and the protection of individuals' rights is all but non-existent.

The family at Colocação Tucano was forcibly expelled by a nearby rancher in 1985 after the family had lived there for 15 years. The rancher was going to deforest the area for pasture. They were financially compensated for the thatch house that they left.

Only four (05.0 percent) of the surveyed colocações had any title, receipt, or other document of land ownership. Besides these four, 84 percent of the families acquired their colocações as a result of a trade transaction, while an additional 11.4 percent acquired their current colocação through inheritance (FUNTAC 1990b:17).

In a 1994 survey of 35 colocações in the Antimari area, only seven households held any kind of documentation attesting to their ownership of the *colocações* on which they lived. Only one of these seven families was in possession of a title to their land registered with the government. Two others possessed a *declaração de terra*, a document attesting to squatters rights on the land. The remaining family had only a handwritten receipt of sale from the family from whom they had bought the colocação—a family that had no legal title to the land. In all other cases the family had no documentation of ownership of any kind nor did they have any evidence to support their claims to have lived on and improved the land for over five years, thus entitling them to rights under squatter's law.

Resource Allocation

Most local resources, except fish and game, are immobile, abundant, predictable, and easy to defend if need be. However, the degree of territoriality, i.e. concern with defending the resources of a particular area such as a colocação, is small in Antimari as there are few real threats to exclusive exploitation by the resident family. The physical isolation of each colocação, coupled with the fact that, in Antimari, the ecosystem is rich in game and useful plants, and there is enough fertile land per colocação for each family to grow at least a subsistence crop, virtually precludes competition over scarce resources.

Due to the relative homogeneity of the rainforest topography, colocação boundaries are rarely natural landmarks. However, traditional people go to no great lengths to demarcate their holdings. Although boundaries are vague and sometimes contested they are generally not an issue of contention. This indicates a lack of concern over guarding access to both fixed and mobile natural resources found within colocações' boundaries. The only quarrels over resource exploitation noted in Antimari related to tapping rubber trees along vaguely defined colocação borders. Although not always settled to the satisfaction of both parties, these disputes seldom involved threats or violence. In addition, although there are no legal constraints, there are cultural mechanisms that regulate recourse access and use in Antimari. Tapping, gathering, and hunting on another's colocação without permission is a trespass. Affront is taken and redress may or may not occur depending upon the relationship between families involved. Conflicts like this occur more frequently in the interior which is less densely populated and has the least distinct borders between colocações. In the case of the family living at Colocação Deixa Falar where the husband could not work in the forest because his foot had been badly bitten by a caiman, they are afraid of their neighbor and will not confront him about tapping rubber on their land because they feel that they would be negotiating from a position of weakness. If the neighbor opts to endure public consternation at his usurping their resources there is little recourse for the family.

Common Property

Any of Antimari's natural resources that lie within an inhabited colocação are considered the property of the family who lives there and, in most situations, others may not exploit them without permission. In contrast, local people treat as common property the rivers, streams, all previously uninhabited areas of the forest and any other resources that do not lie within an occupied colocação. However, when a family opens a new colocação or moves into an abandoned homesite, all its resources belong to that family. Sometimes, in order to avoid the labor of clearing new land, local residents plant crops in the cleared plot of an adjacent, abandoned colocação. In such cases the crop is considered the property of those who planted it but the other resources of the abandoned colocação remain common property.

Although not members of a discrete community in the traditional sense, Antimari's residents maintain a distinction between themselves and outsiders. Usufruct rights regarding natural resources are extended only to families known to local residents. People who have never lived in Antimari and who have no relatives there are considered trespassers and as such are not permitted to hunt, fish, or otherwise exploit area resources unless they establish residence. The principal concern involves sport fishermen from urban areas who travel down the Antimari river and harvest local game fish. Antimari residents resent the outsider's presence and note that these intruders indiscriminately shoot caiman and other non-game animals and leave the carcasses to rot on the river's banks. While traveling with local residents I stopped twice to examine caiman carcasses and found that they had been shot by large-caliber rifles. Antimari residents do not own large-caliber rifles and do not usually hunt caiman. Although there no legal prohibitions barring outsiders from exploiting local resources, trespassers entering the area to hunt or fish are met by a delegation of local residents armed with shotguns. Despite the lack of legal authority, there were two incidents in 1994 wherein local residents armed with shotguns repelled sport fishers who were entering the Antimari area by boat. Out-numbered and out-gunned, the intruders gave little protest on both occasions. However, with the exception of sport fishermen and two men who moved from Rio Branco to live deep in the interior of Antimari's forest to avoid legal prosecution for murder, few outsiders attempt to enter Antimari to exploit its resources.

Socioeconomic Brief

A total of 35 of the area's 91 colocações were occupied in 1994. The resident families' production activities centered around subsistence horticulture and livestock husbandry, hunting and fishing, tapping rubber trees, and collecting Brazil nuts. But Antimari is an economy in transition away from traditional extraction based on producing rubber and Brazil nuts for a patrão. In recent years, changes in pecuniary externalities, specifically inflation and a decrease in national and international market prices for rubber, have caused the former patrões to abandon their control over Antimari's colocações, leaving resident families more autonomous but with insufficient market access and little demand for the natural latex that constitutes the area's principal commodity. Moreover, the move toward alternate household production strategies has not been smooth nor completely adaptive as they do not completely overcome new economic constraints. No form of market link replaced the patrões and itinerant merchants after these economic intermediaries diminished their involvement in the area. The result was that many of the households in

Antimari have no buyers for their extracted products and no one to extend them credit toward the acquisition of industrialized necessities. This situation, combined with a lack of assistance from the state, a high level of illiteracy, Antimari's geographic isolation and the everyday adversities of the traditional rural life, have reduced the economic capacity of the local population and diminished their standard of living and sense of well-being. The process of adaptation and adjustment has been accompanied by internal and external migration, and changes in land tenure, production orientation and economic relationships, all of which will be explored in following chapters.

CHAPTER 4
HISTORY OF HUMAN OCCUPATION

The Indigenous People of Antimari

The indigenous peoples of the middle and upper Purus river basin included the Purus-Purus, Canamari, Jamamandi, Moxos, Muras, and the Apurinãs (IBGE 1987, Steward and Faron 1959). Chandless (1866a) reported that the Apurinãs extended up the Rio Acre for eight or ten day's journey, a distance that includes the area around mouth of the Antimari River.

Despite the adoption of the name Apurinã by themselves and the Brazilian government, Grubb (1927:102) reports that they were originally called Kangite. They have also been called the Hypurina, Hyupurina, Jupurina, Kangütü, Popingá, Kankiti, Kankete, Kangitê, and Cángiti (Kroemer 1985:106, Metraux 1948, Polak 1894, Steere 1903:374). Their language is a dialect of Arawak, a linguistic family whose members include slightly over 200 tribes (IBGE 1987). But their use of sacred flutes and bark trumpets links the Apurinãs with some of the non-Arawakan peoples of the Northwestern Amazon (Steward and Faron 1959:348-49).

Before the arrival of Brazilian traders, the Apurinãs were sylvan instead of riverine in lifeway orientation and only visited large rivers to collect turtles (Chandless 1866b, Steere 1903). However, they engaged in little agriculture except manioc, plantain and banana cultivation and frequently left their villages on extended hunting expeditions (Chandless

1866b, Polak 1894, Steere 1903). Their diet depended largely on fishing and hunting for which they used the blowgun, spear, and arrow and bow. Artisanal production included the manufacture of twilled baskets, plain pottery, hammocks, loom-woven bands and dugout and bark canoes. Fashioned out of a single piece with the ends left open, their bark canoes could hold up to six people. They probably never used their canoes on the Purus River but remained on its smaller affluents such as the Antimari (Chandless 1866b, Steere 1903).

Both men and women painted their bodies and wore tangas but used no head or foot gear.[1] Although both sexes pierced their ears, only men perforated their nasal septums while only women perforated their upper and lower lips. They lived in houses approximately 8.5 meters long and 13.5 meters wide with walls that curved to form a roof 7.5 meters in height. Each house accommodated three or four families (Chandless 1866b, Steere 1903).

Steere (1903:374) notes that they preserved their dead by wrapping them in bundles and hanging them from the roof of one of their houses that had been deserted for that purpose. However, Chandless (1866b:97) specifically refers to the Apurinãs burying their dead and burying or otherwise leaving food for them and, "when the bones are clean, take them up, and have a festival and a funeral oration; the orator taking up, e.g. the arm-bone, and singing, 'With this arm he did,' & etc.—recounting the great deeds of the dead."

They were also reputed to have been aficionados of war who were constantly battling one village against another (Chandless 1866b). They used poisoned arrows and small poisoned blowgun darts without fletching. Early non-indigenous settlers called the Apurinãs cannibals but they are reported to have eaten only vanquished enemies.

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[1] Tangas are pubic coverings in the form of aprons or small triangles of inner bark or cloth.

Moreover, despite their warlike reputation, they were never reported to have attacked intruders as did the Mura and other riverine groups of the western Amazon (Kroemer 1985, Polak 1894).

The socioeconomic system consisting of foodstuff production for domestic consumption and the extraction of forest products for trade which is found in Antimari today started with these local Indians. The Apurinãs inhabiting the mouths of the Rio Acre and Rio Antimari had already traded with Manoel Urbano da Encarnação and his sons for more than 25 years before the area's colonization by Brazilians in 1877 and 1878, and cooperated with the new arrivals with little friction (Castelo Branco 1961:178). They tapped rubber to obtain trade goods that they could exchange for food, hardware, and alcohol (Polak 1894).

As rubber tappers from Brazil's Northeast came into the region, they pushed the Indians into more remote parts of the territory and away from the main waterways such as the Antimari, Acre, and Purus rivers. Although they stole Indian women for sex, the newcomers considered the indigenous population as a whole to be "prejudicial and evil animals," especially by those who ran rubber operations and were inclined to kill any Indians who resisted the occupation of their lands (Kroemer 1985:87). Toward that end, rubber estate owners hired professional gunmen, not just to purge indigenous areas but to organize hunting forays to capture Indians to sell to neighboring rubber tapping operations employing Brazilians. Indigenous people were in demand principally for their superior hunting ability that would bring in game with which to feed the rubber tappers (Grubb 1927:100, Kroemer 1985:87-88). Some operators of rubber estates attempted to entirely eliminate local Indians by setting out clothing left by workers who had died of diseases for the Indians to take and thereby become infected. Under these pressures, the Indians had little option but to turn to working as tappers or hunters for rubber extraction operations, furnishing food and sometimes tracking their own relatives who had retreated further into the forest (Kroemer 1985:88). Thus, the Apurinãs who survived the hunting expeditions that swept the area of the mouth of the Rio Acre, including the Rio Antimari, turned to rubber tapping (Kroemer 1985:89, Steere 1903:374). In 1926, they still numbered 2,000 or more individuals but Brazilians continued to kill many in Acre and as late as 1955 some Brazilians' personal prestige still rested on having killed many Indians on their lands (Grubb 1927:102, Schultz and Chiara 1955:182). By mid-1900s there were only three Apurinã families living near the mouth of the Rio Acre. The men were employed as rubber tappers, agricultural help, and hunters and fishers while the women traded in pots and other household items that they made from local clay. They spoke Arawakan among themselves and Portuguese to the Brazilians with whom they traded (Schultz and Chiara 1955:182).

The Apurinãs were once the most celebrated tribe of the Purus (Grubb 1927:102). Today they are in permanent contact with Brazilians and are becoming increasingly acculturated. They now live in three Indigenous Areas in the state of Amazonas, Brazil: the 15,050 hectare Apuriná do Igarapé São João Indigenous Area in the District of Tapauá which had a population of 53 in 1991; the 96,457-hectare Apuriná do Igarapé Indigenous Area in the district of Tauamirim which had a population of 119 in 1991; and the 33,400-hectare Apuriná do Kilometer 124 Indigenous Area in the district of Boca do Acre located less than 100 kilometers (62 miles) northeast of Antimari, which had a population of 150 in 1991 (FUNATURA 1992:65).

Post-Contact History of Antimari

The region of the Amazon basin now known as the Brazilian state of Acre, including the area called Antimari, originally became known to Brazilians because of the exploration of the Purus River.[2] In 1494, Pope Alexander VI signed the Treaty of Tordesillas that divided the then-known New World between Spain and Portugal. However, by 1750, Spain and Portugal had explored enough new territory that the old treaty was no longer practical. That year Spain and Portugal signed a new resolution, the Treaty of Madrid. After ratifying the treaty, the Portuguese government delineated the *capitania* of São José do Rio Negro on March 3, 1755, with the objective of protecting and administering the western part of the Portuguese-controlled area of the Amazon basin then called Grão-Pará.[3] The capitania's headquarters was established on the Rio Negro in 1757. But the Rio Negro is poor in both flora and fauna—so much so that it is often referred to as a river of famine. Consequently, the headquarters strategically located on its banks needed to obtain a large part of its supplies from the resources of the bountiful lower Rio Purus to the south where hunters captured over 53,000 turtles to provide for the more than 430 residents and troops garrisoned at the headquarters on the Rio Negro. The troops used the meat for food and burned turtle oil for illumination. They also collected sarsaparilla and copaíba oil along the Purus during expeditions lasting up to 40 days (Kroemer 1985:30, Reis 1953).

Despite these early forays to the extreme lower Purus, the Brazilian government had yet to commission an expedition to explore and map the 3,218 kilometer (2,000 mile) long river because the Purus region was not the subject of border disputes nor was it a corridor for pursuing Brazil's political and economic interests of the period (Kroemer 1985:31). The first exploration of the Purus river coincided with the beginning of the Amazon region's economic importance when Brazilians started to frequent its lower extremity in pursuit of sarsaparilla, spices and medicinal plants, collectively known as *drogas do sertão*, or medicinals from the back-country, in the beginning of the 1800s (Cavalcanti 1983:23, Tocantins 1961). By 1845, the Indians of the lower and middle Purus river were trading sarsaparilla, fruit, Brazil nuts, wood distillates, fish, manatees, turtles, and terrestrial game. They extracted these products from the natural environment in exchange for the cloth, mirrors, glass beads, and other industrialized goods that Brazilian traders brought into the region (Kroemer 1985:45-46, Polak 1894).

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[2] The name Purus is a corruption of *purupurú*, a Lingua Geral term meaning *painted people* referring to the Paumari Indians who lived in the region (Castelo Branco 1947:104, Ferreira 1932:24).

[3] *Capitania* was the Portuguese term for the first secular administrative divisions in Brazil.

In 1852, Manoel Nicolau de Melo of the Brazilian state of Pernambuco registered the first land claim on the Purus and, by 1854, Capuchin friars had established a mission 157 kilometers (98 miles) upstream from the river's mouth (Tocantins 1961:128). However, they abandoned the mission after only two years due to accusations against Friar Pedro de Ceriaña, by traders who did not want the Church to infringe on their use of local indigenous labor (Kroemer 1985:52). The mission's closing confirmed the dominance of commercial interests over those of the Church in the Purus river basin and, with the absence of clergy to ameliorate exploitation of the Indians, interest in trade for the region's natural recourses increased steadily (Kroemer 1985:54).

All of this was happening over 1,609 kilometers (1,000 miles) downstream from the Acre region of the Purus river basin wherein lies Antimari. However, from May to October of 1852, the Brazilian, Serafim da Silva Salgado, accompanied by twelve Indians and twelve soldiers, ascended the Purus river into the Acre region to the *igarapé* Arraria in an effort to discover a passage between the Purus and the Madeira river which parallels it approximately 200 kilometers (124 miles) to the east.[4] Salgado was the first non-indigenous person to pass the mouth of the Rio Acre but provided no information about the area in his writings (Castelo Branco 1947:128, Kroemer 1985:49, Prelatura de São Peregrino do Servos de Maria nos Altos Acre e Purus 1928:7).[5] With its mouth located 1,776 kilometers (1,103 miles) from the mouth of the Purus river, the Rio Acre is the largest of the Purus' tributaries. The Rio Antimari, which flows through the area of this study, meets the Rio Acre 45 kilometers (28 miles) upstream from the latter's mouth (see Figure 3.2).

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[4] *Igarapé* is a Tupi Indian word meaning small stream and usually denotes a flow that is navigable by canoe but which may be seasonally dry.

Following Salgado, the veteran explorer, Manoel Urbano da Encarnação traveled over 500 kilometers (311 miles) up the Purus river starting at the mouth of the Rio Ituxi and reaching the mouth of the Rio Acre in the beginning of 1861 (Prelatura de São Peregrino dos Servos de Maria nos Altos Acre e Purus 1928:7). Urbano then explored the Rio Acre for twenty days before returning to the Purus river (Castelo Branco 1947:128, Costa 1940).[6]

Although exploration of the Purus basin had been delayed, the exploitation of its rainforest products thereafter was not. By 1861, over 549,375 kilograms of rubber had been extracted from the Purus basin while the region was still the exclusive dominion of the Indians (Costa 1940:120). One year later, a steamboat expedition traveling up the Rio Purus reported extraction and trading by non-Indians who also employed indigenous people to collect Brazil nuts, rubber, drogas do sertão, fish, and turtles.[7] By that time

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[5] Lábre related that the Apurinã Indians called the Acre river "Uakiry" while Polak reported that its original name was Ywákyry (with carets over all three "y"s) (Lábre 1888:114, Polak 1894:iii).

[6] Tocantins (1961) claims that the then President Manoel Clemintino Carneiro da Cunha mandated Urbano's voyage to find a river or land route to Bolivia with the hope of importing cattle. However, Chandless (1866b) reports that, like Salgado's foray in 1857, Urbano's party had been sent up the Purus to discover a waterway linking it and the Rio Madeira that would avoid the latter's rapids that prevented even small boats from penetrating the region at certain times of the year and barred large boats and steamboats year round.

[7] The first steam navigation in the Amazon basin occurred in 1853 (Mata 1978:13). Boats

Brazilians had only occupied the Purus river up to the site of the current town of Canutama in the state of Amazonas, still well over 643 kilometers (400 miles) downstream from the region of the Acre and Antimari rivers (Kroemer 1985:61).

In 1864, the English explorer William Chandless surveyed the upper Purus river. He traveled 2,607 kilometers (1,620 miles) from the mouth of the Purus and was the first to provide geographic documentation of the Acre region including fixing points of latitude and longitude through astronomical sightings (Cavalcanti 1983:24, Costa 1940, Kroemer 1985, Tocantins 1961:95, 1978:90, 1984:40).[8] When Chandless first explored the upper Purus it had no inhabitants of European descent (Chandless 1866b). However, in 1866, after two decades of diplomatic pressures from Great Britain, France, and the United States, the Brazilian government opened the Amazon River and its affluents to free navigation by vessels of friendly nations thus contributing greatly to its economic expansion (Costa 1940:113). The opportunity provided by the newly available steamboat travel along the Purus, coupled with a rapidly increasing worldwide demand for rubber, spurred dramatic influxes of Brazilians into the Purus basin. In 1869, the Companhia Fluvial Paraense (Pará River Company) started trading by steamboat on the Purus river and by 1873 there were 5,000 Brazilian *seringueiros* tapping rubber on its banks upstream as far as the mouth of the Ituxi river (Costa 1940:97, Kroemer 1985).[9]

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as large as 60 to 80 metric tons are able to navigate up the Rio Purus to the mouth of the Rio Acre if they are built along shallow-draft, riverboat architecture (FUNDESREC 1986:169).

[8] Chandless fixed a correct geographic point for the mouth of the Rio Antimari but wrongly identified the river by the names Endimary and Endimari, the latter of which is actually the name of a river that flows into the Rio Ituxi approximately 50 kilometers (31 miles) to the east (Chandless 1866a, Masô 1917).

[9] *Seringueiro* is the Portuguese term for rubber tapper. New interest in rubber extraction brought a great number of Brazilians into the region but it had been ceded to Bolivia in 1867 by the treaty of Ayacucho. However, the newly arrived Brazilians refused to accept

In the years 1877 to 1879, there occurred a great drought in the Northeast of Brazil, the famous Seca dos Três Setes or Drought of the Three Sevens.[10] Those who could chose migration over starvation and fled west on the Amazon River. In 1877, more than 14,000 people left the northeastern state of Ceará for Amazonia. In 1878, 54,000 more refugees left the Northeast to tap rubber in the West (Costa 1940:102). They then moved from the Amazon River up the Madeira, Purus and Juruá rivers as these were easily navigated by steamboats and because the density of the forest precluded travel by land (Castelo Branco 1961, Guerra 1955). Their settlements remained on or near the rivers' banks for the same reason. By 1878 it was estimated that 8,000 Brazilians had settled in the Purus river basin and a large wave of migration followed in 1879 as a response to the

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Bolivian authority, created an independent territory, and demanded its annexation to Brazil. In response, Bolivia established a military outpost called Puerto Alonso (today Porto Acre) on the Rio Acre in January, 1889. Support from the neighboring state of Amazons spurred local Brazilians to declare the Republic of Acre in May of that same year but Brazil could not incorporate the region without violating existing treaty obligations. In 1901, Bolivia leased the region to the Bolivian Syndicate of New York. Although it had its own police force and an armed fleet of riverboats, the Syndicate declined to exert authority in the region after company representatives who visited the village of Antimari found the area dominated by Brazilian revolutionaries (Pinheiro and Mendel 1995:18). In August of 1902, a Brazilian guerrilla force consisting of little more than 2,000 rubber tappers under the leadership of José Plácido de Castro started an insurrection. By January of 1903 local Bolivian forces were defeated and Plácido de Castro was proclaimed governor of the independent state of Acre. On January 17th of that same year, Brazil bought the region from Bolivia for two million pounds plus a commitment to build the Madeira-Mamoré railroad. Thus on February 25, 1904, the Brazilian Federal Territory of Acre was formed.

[10] Dry periods come to the 950,000 square mile region of northeastern Brazil known as the Sertão on an average of every ten years and vary in duration from one to three years (Hirschman 1963). In the Northeast, the population influx that had started in the 16th century had placed pressure on land resources by the second half of the 19th century. In addition, in the 1860s there had been a sharp rise in international cotton prices caused by the U.S. Civil War which fostered intensification of cotton production in Brazil's Northeast and brought a period of prosperity that lured the local population out of a relatively secure subsistence economy. The ensuing post-war economic instability festered and became disastrous during the 1877-1879 drought when over 200,000 Northeasterners died from lack of food (Furtado 1963:145-146).

continuing years of drought in the Northeast (Moore 1904:1).[11] As a result, by 1880 over 30,000 people were extracting forest products for trade along the Purus despite epidemics, especially of measles, that produced mortality rates of up over 75 percent (Ferrarini 1980:83). As steamboats dispersed settlers provisioned with rations, arms, and tools for tapping rubber, the newcomers established the first *seringais*, or rubber estates, in the region of the upper Purus known as Acre (Costa 1940:101, Tocantins 1984).[12]

The first Brazilian settlers to move into the Acre region arrived by steamboat with João Gabriel de Carvalho e Melo from the town of Uruburetama in the state of Ceará. Gabriel had lived with four families from the states of Maranhão and Ceará while collecting and trading sarsaparilla on the lower Purus river since 1857 (Tocantins 1961:128). In 1874, he traveled to the mouth of the Acre river where he established a rubber extraction operation using the local Apurinã Indians as labor. Three years later, Gabriel led a party of migrants that arrived at the mouth of the Acre river on April 3, 1877 on the steamboat, *Anajás*, of the Companhia de Navegação a Vapor do Rio Amazonas (Amazon River Steam Navigation Company) of the state of Pará (Falcão n.d.:2, Loureiro 1986:45, Reis 1953:33, Tocantins 1961:130).[13] The voyage had been so arduous and doubtful of success that Gabriel eventually had to arm his party and force the boat's captain to continue up the Rio Purus until reaching the Rio Acre (Ribeiro 1930:35 as cited in Castelo Branco 1947:132).[14]

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[11] It should be noted that, although the severe drought of the Northeast greatly accelerated migration into the Amazon basin, it did not create it. Increased international demand for rubber, coupled with low standards of living in the Northeast had already influenced westward migration (Coelho, 1982:76).

[12] *Seringais* is the plural form of the Portuguese, *seringal*, or rubber estate.

[13] In response to the drought, governments in the Northeast paid passage for many out-migrants and some members of Gabriel's party received such aid in 1877 (Castelo Branco 1947). The Amazon River Steam Navigation Co. Ltd., a subsidiary of the privately owned but federal government subsidized company, Port of Pará, carried freight and passengers from the state of Pará to the Purus until the mouth of the Rio Acre and up the Juruá river until Cruzeiro do Sul. After that, transport was by smaller steam boats. Even more remote areas could be reached using still smaller boats and canoes. Everything including passengers, cargo and livestock was transported in this manner (Coêlho 1982:33). The Pará firm of Elias J. Nunes da Silva e Cia. sponsored Gabriel's party which consisted of 56 people from Ceará, many of whom were his relatives and friends including José de

Upon their arrival, some members of Gabriel's expedition stayed at the mouth of the Rio Acre, while others traveled farther up the Rio Purus. Escolástico de Carvalho of the state of Piauí, along with Felisimino Alves dos Santos, ascended the Acre river for 69 kilometers (43 miles) and while en route, became the first non-natives to explore the Rio Antimari (Castelo Branco 1947:132-133). The other members of the group established themselves along the 45 kilometer (28 mile) long river bank between the mouth of the Rio Acre and the mouth of the Rio Antimari and opened the first seringais in the Rio Acre region (Bittencourt 1932, Castelo Branco 1947:134, Tocantins 1961).

After this initial commercial penetration into the Acre region, colonization accelerated rapidly as newcomers claimed 10,000 to 15,000 meter-wide sections of riverbanks to an undetermined depth into the forest while others, eager to secure land bearing rubber trees, claimed entire river basins (Castelo Branco 1961:177). The influx of refugees was so great that by 1887, Colonel Antonio Lábre, after whom the Purus river town of Lábrea was named, described the Rio Acre as:

> . . . one of the most populous affluents of the Purus, exporting today 500,000 kilos of rubber. In a short time it will increase its production. Its population is 10,000 souls not including the aborigines that reach double that number. Rubber tappers conduct

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Matos, Chagas Souza, and Alexandre de Oliveira Lima who later was known as the Baron da Boca do Acre (Castelo Branco 1947:132, Tocantins 1961). Lima's daughter, Mariana Paz de Ávila, was Gabriel's wife (Castelo Branco 1947:132).

[14] In 1903, the prefect of the Amazonian Departamento do Alto Purus, Cândido Marianno, commented that the torturous voyages of 20, 30 and 40 days were so onerous that they left the Northeasterners "physically and morally subjugated by the physical misery that completely dominated them, producing an excellent stage for the invasion and development of malaria and other infirmities, reaping a large number [of settlers], the situation further aggravated by the abuse of alcohol and treatments adopted to cure the diseases of poor hygiene . . . ." (Mariano 1906:34, 35).

> commerce using more than 15 large steamers that, during the rainy season, navigate the river annually carrying new workers and supplies (Lábrea 1887:34).

In 1888, Manoel Felício Maciel founded a village located at the confluence of the Antimari and Acre rivers. João Damasceno Girão, who later traded for products, mostly rubber extracted from Antimari's forests, had a commercial house at the village and in the important rubber producing area of Xapuri. His influence persuaded the government to declare Antimari a *vila* in 1890 and separated the District of Antimari from the District of Lábrea whose seat was over 700 kilometers distant by river.[15] The new District of Antimari stretched from the mouth of the Rio Inauini to the Bolivian border (Castelo Branco 1961:185, Ribeiro 1930:41, 268). In 1895, Vila Antimari and its vicinity was elevated to the status of a *comarca*, a Brazilian judiciary division (Castelo Branco 1947:125). However, Law No. 166 of May 15, 1897, restored its status as a *vila* and renamed it, along with the District, Floriano Peixoto (Castelo Branco 1947:125).

Until 1896, there was a group of Apurinã Indians living in the area but the Rio Antimari still contained no rubber tappers. At this time, the government granted João Fábio Lins de Oliveira 333,000 hectares along the Antimari river where he established the seringais Arapixí, Limoeiro, Pacatúba, and Mapinguari in the same location along the Antimari river that is the focus of this dissertation (Cartorio de Imoves - Boca do Acre, Acre, Brazil).[16]

By 1899, the Acre region produced more than 60 percent of all rubber from the Amazon basin, more the 12,000 metric tons in one year (Costa 1940:109). At Vila

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[15] A Brazilian *vila* was a legally recognized small town or borough. The term *district* as used here refers to the Brazilian political demarcation termed *distrito municipal* or *município*.

[16] Mapinguari is the local name for a large, wild anthropoid similar to a Yeti or Sasquatch that is said to inhabit the forest of Antimari. The word is also a Tupi name for an ill-omened spirit.

Floriano Peixoto near the mouth of the Rio Antimari, there was a large floating dock where the Pará firm of Barbosa and Tocantins traded with the up-river inhabitants of the Antimari and Acre rivers from 1896 to at least 1906.[17] By 1902, the district had a population of over 12,000 people involved in extraction of forest products, principally rubber. Traders and government appointees constructed private buildings and warehouses at the vila to administer the district and conduct trade. By the turn of the century, the vila contained approximately 300 permanent inhabitants living in "poor, low dwellings with no public buildings, all constructed of paxiúba [palm wood] . . . . The area was unhealthy and dominated by malaria and beri-beri. But people still considered Antimari the principal locality in the region" (Loureiro 1986:53, 54).[18]

One of the problems of identifying exactly who were the owners of the area now called Antimari is that during the Brazilian Amazon region's two rubber booms there was an extremely high tax on land that supported rubber trees. To avoid being heavily assessed, people who possessed land in Acre did not officially claim and title all that they owned. Frequently, the owners would register only part of their land and that is all that appears in the historical record (Limana 1994). In 1911, Lins de Oliveira had a trading company called Ribas and Company which sold part of the Antimari area, then known as Seringal Arapixi, to the firm of Pina Fernandes and Company. Then, at an unknown date after 1911, the firm Zarges Berringer and Company bought the land (Cartorio de Imoves - Boca do Acre). However, the record of ownership remains unclear for many years thereafter until 1955 when the land was sold to Idesio Dautron Pinto da Frota who promptly sold it to João Ferreira Antro the same year. In 1956, Ferreira sold the land to Nógeira Irmáos and Company who, in 1963, sold it to Farid Mardy, remembered locally as, The Turk.[19] Records of land transactions are again incomplete until 1972 when three men from Rio de Janeiro and São Paulo claimed that they were the owners of Antimari with title registered with the Instituto Nacional de Colonização e Reforma Agrária (INCRA), the National Institute of Colonization and Land Reform. In 1973, they sold the title to the firm of Fernando Dinis de Oliveira and Associates. In 1982 that firm sold the land to Fernando Dinis de Oliveira (Cartorio de Imoves, Boca do Acre).

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[17] The Rio Acre was navigable for commerce all year except from December to May. Rubber tapping along the Rio Antimari was served by the 123-foot steamboat, *Antimary* owned by the Pará trading firm of Kalkman Zeizing and Co. (Falcão n.d.:50).

[18] On May 2, 1934, the government transferred the district seat to the settlement of Boca do Acre at the mouth of the Rio Acre which gained the status of a *vila* the same year (Castelo Branco 1947). It was then elevated to the status of a city in 1938 and became Santa Maria da Boca do Acre in 1943 (Castelo Branco 1947). The new site boasted an agreeable, breezy climate, potable water, a medical facility and at least two commercial houses (Castelo Branco 1961).

That is as far as official documentation goes toward identifying the legal owners of Antimari. Furthermore, *de jure* title to land in Acre often has little to do with its *de facto* possession and control of its resources. In the past, owners of rubber estates subdivided them into areas small enough to be worked by one or two rubber tappers. Each subdivision, called a *colocação*, would then be worked by an individual family placed there by the seringal's owner, or patrão, to whom the family was tied through mutual social and economic obligations.[20] In the area of Antimari, Emilson Cândido and António Mereiros were patrões (the plural form of *patrão*) who appropriated land from the original settlers who had previously opened rubber trails. Cândido and Mereiros then bought or opened colocações on adjoining land, Mereiros at Seringal Limoeiro and Cândido at Seringal Mapinguari. Mereiros had 21 colocações around Seringal Limoeiro and holds a map showing twenty colocações that he claims to have owned starting in the 1960s. In addition, upstream from Colocação Cumarú there occurred invasions by outsiders who opened their own colocações and other squatters came from the nearby ranches and the dirt road designated BR-364. So legal ownership by the patrões did not always give them secure rights to the land. Continuous control over local production, transport, and marketing of rainforest products was necessary to ensure their claim to the land's resources. As their economic power waned along with rubber prices in the late 1980s and early 1990s, Antimari's patrões became absentee landowners and eventually relinquished claims to their previous holdings except the colocações where their trading posts had been located. When this occurred, the local rubber tappers gained control of the colocações at which they had been placed by the patrões. The tappers then gained heritable squatter's rights which included the right to live on the land, exploit its resources, or sell their interest. In addition, when the patrões relinquished control over their previous land holdings, there were some colocações that had had no tenant for many years. These were now occupied by immigrant squatters who reopened rubber trails and regarded the colocações as their own property. Today there is a constant movement of families from one colocação to another within Antimari, as well as immigration and emigration, with little concern over legal ownership of the land.

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[19] Non-Brazilians constituted a large part of the local population in the first part of the 1900s in the Acre region of Sena Madureira, only 80 geographic kilometers (50 geographic miles) from the location of this research. According to a 1918 census of town of Sena Madureira, close to 217 foreigners inhabited Sena Madureira including Peruvians, Bolivians, Portuguese and Turks; the latter of whom were actually Syrian, Lebanese, and Armenian. Until the end of WWI, Turkey dominated Syria, Lebanon and Lower Armenia so these immigrants possessed Turkish passports and were collectively referred to as Turks (Loureiro 1986).

[20] A *colocação*, is traditionally a subdivision of a rubber estate and contains rubber trails usually exploited by a single family. *Colocações* is the plural form of the word.

History of the Rubber Economy

The First Rubber Cycle

The last quarter of the 19th century was marked by a great consolidation of monopolistic capital, the emergence of gigantic extra-national corporations, and rapid developments in the chemical, electrical, steel, and transportation industries. In addition, new mergers of bank and industrial capital bolstered rising economic and industrial powers such as Germany, Japan, and the U.S.. This engine of progress, combined with the newly discovered process of rubber vulcanization and the invention of the pneumatic tire, transformed rubber, formerly a minor forest product and almost a novelty item outside of the tropics, into a primary raw material for world industry. The transformation also turned the economic backwater of Acre into a focal point of world rubber production.[21] Exports of Brazilian rubber rose from an average of 6,000 tons per year in the 1870s to 45,000 tons per year by 1911 (Bernades *et al.* 1990:83). But at the turn of the century, English and Dutch commercial rubber plantations were established in Asia and Brazil began to lose its position as the major producer. The rubber produced on Asian plantations was of a more uniform quality than its Amazonian competition. This fact, combined with its more reliable rate of supply, lower transportation costs, and the economy of large-scale production, allowed Asian rubber to outperform its Amazonian competitors in the international market. Four tons of rubber produced in Asia in 1900 became 145 tons in 1905, 8,000 tons in

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[21] In 1888 John Boyd Dunlop produced the pneumatic tire to feed the exploding bicycle tire industry in the USA and Europe and by 1890 cars were being mass produced in the United States producing a huge demand for rubber, the vast bulk of which was produced by wild trees in the Brazilian Amazon.

1910 and 150,000 tons by 1916 (Freyre 1970:246). The ample supply of cheaper, better rubber also affected international prices. In 1910 rubber prices went from close to US $3.00 per pound to just below US $1.20 per pound in a few months and heralded the start of a decade-long decline that left the Amazon's extractive economy in shambles (Weinstein 1983:213).

Acre had been at the core of the rubber boom starting in the 1880s. But by 1912 the region returned to being economically unpromising as relations between rubber tappers and their patrões adapted to the changing economic realities of decreased world demand for rubber (Weinstein 1983). Some patrões who could no longer extend credit to tappers opted to rent their colocações to the resident families. Others simply abandoned their holdings. Many tappers then became autonomous and could trade rubber for supplies with whomever they chose and, being free from previous restrictions on practicing agriculture, could now grow subsistence crops and even sell farm surpluses (Loureiro 1986). But the change in economic relations was not as liberating as it may sound. Tappers generally had to pay for food, medicine, and supplies at the time of purchase—a new economic reality that made their precarious lifeway based on rubber extraction even more difficult. The result was a mass out-migration of tappers while trading firms closed and cities emptied (Schurz 1925). However, many who remained on their colocações became default owners and continued to eke a living from a combination of rainforest products extraction, subsistence horticulture, hunting and fishing.

By 1920, Brazilian production was down to 42,000 tons while Asian plantations produced 360,000 tons and, by 1926, plantations in Asia were producing 93 percent of the world's rubber (Soares 1927:35). At that time, rubber products manufacturing in the United States accounted for the vast majority of world rubber demand. However, the reaction of American rubber products companies to British domination of supply through their plantations in Asia was subdued. They were prepared to accept higher prices as the cost of more predictable supply (Dean 1987:67). The exception was Henry Ford who in 1928, armed with a concession involving the control of one million hectares of territory along the Tapajos river in the Brazilian state of Pará and a guarantee of a fifty-year exemption from taxes from the new enterprise-oriented Getúlio Vargas presidency, launched a an ill-fated rubber plantation project called Fordlandia. Political opposition from the Amazon's traditional elites, poor site selection, lack of sufficient seed, escalating costs, mismanagement, labor problems, and the South American Leaf Blight, doomed the venture, as well as its daughter project at nearby Belterra. The Ford plantations remained the only significant attempt in Brazil to cultivate rubber at that time (Dean 1987:86, Schmink and Wood 1992:46-47). In addition, starting with the Vargas presidency of 1930, Brazil began to expand its industrial base located in the southern urban areas. As a consequence, political and economic power shifted from the agriculturally-based elites of the "Old Republic" who had been controlling each state as if it were sovereign, to urban industry. The Vargas government, eager to develop new sources of income for the federal government, also formulated and implemented economic policy on the national level and set a precedent for federal programs and mandates of the 1970s (Schmink and Wood 1992:47).

The Second Rubber Cycle

The rural population of the Amazon, especially the Acre region, declined steadily until WWII despite a Brazilian government program that had guaranteed the purchase of all rubber production at artificially high prices (Allegretti 1990:225). Then World War II fostered the Amazon region's second rubber cycle which occurred from 1939 to 1945. In response to the Japanese occupation of Asian rubber producing areas, an agreement between the USA and Brazil, called the Washington Accords, ensured the Allies a strategic supply of rubber in exchange for an infusion of capital into Brazil through the establishment of the Rubber Credit Bank with 40 percent of its assets furnished by the United States government. In addition, approximately 24,300 rubber tappers were recruited to form a Batalha da Borracha, or Rubber Battalion, of tappers to collect the resource. Thus, the Amazonian rubber economy was revived, prompting a new wave of migration from the Northeast to Acre. Total natural rubber production in Brazil went from 13,364 tons in 1940 to 25,051 tons in 1945 (Dean 1987:170). Rubber production in Acre, which was at 5,430 tons in 1940, reached 5,841 tons by 1942 and 7,870 tons by 1945 (Coêlho 1982:63). However, at the end of WWII, Asian rubber again entered the world market and the value of Brazilian rubber plummeted.

Post-WWII

The end of the 1940s was the beginning of a difficult period for Acre's rubber economy. After the war, Amazonian rubber suffered competition from Asian plantations as it had in the past, but now it faced additional market pressure from advances in synthetic rubber. The Washington Accords were still in effect but the United States was no longer interested in Brazilian rubber and Brazilian industry's rubber needs could not absorb the excess production. At the same time synthetic substitutes for natural rubber were improving and their use was increasing. Nevertheless, rubber remained Acre's largest economic activity, still representing more than 50 percent of its gross domestic product (Coêlho 1982:63). By 1947, Brazil's growing industries demanded more rubber than was then being exported, setting the stage for alliances between industrial interests in the South and Amazonian elites whose combined lobbying resulted in the federal government's extension of price supports and credit for domestic rubber production via the Rubber Credit Bank, renamed the Amazonian Credit Bank in 1950 (Schmink and Wood 1992:48).

With a wider scope for regional development than the promotion rubber production, in 1953 President Vargas also created the Superintendency for the Valorization of the Amazon (SPVEA) to implement federally funded development programs, the most important of which was the construction of the Belém-Brasília highway (1956-1960), which provided the first practical overland route linking Belém, Brazil's most important city on the Amazon river, with the nation's growing South. Soon afterward, more roads were built which connected other important population centers (Schmink and Wood 1992:49).

Aside from road building projects, the SPVEA was generally ineffective as a tool for development except that its extension of credit through the Amazon Credit Bank enabled local elites to appropriate Amazonian land and invest in non-extractive production such as agriculture and ranching which, to varying degrees, changed the nature of socio-economic relations in some former extractive areas. Local economies became monetized in some areas and the traditional, multi-faceted, patron-client, relationship under the aviamento system changed when traders demanded immediate payment for debts and, as the rural people could not pay the debts, took control of lands they occupied, and began to charge rent (Schmink and Wood 1992:49). In addition, friction between tappers, rubber buyers, and the Rubber Credit Bank resulted in many seringal mortgages being defaulted and a general decline in the value of land (Cavalcante 1983:42-46, Hebette 1991). As a result of these factors, along with economic strain caused by high inflation rates in the 1950s and 1960s, even more tappers migrated out of the area and those who remained on their colocações faced even fewer credit alternatives and even lower prices offered for rubber (Schmink and Wood 1992:50). In less than ten years after Asian rubber reentered the international market in 1945, Brazilian rubber's share of the international market dropped from 100 percent to two percent (Santos 1980). Once again, Amazonian rubber tappers became isolated and abandoned by their patrões as rubber prices fell and there was a phenomenal abandonment of seringais by the former tappers from the Rubber Battalion (Nemher 1959).

Brazil's attitude toward its native rubber economy in the 1960s and 1970s was marked by periods of reactionary overprotection interspersed with draconian antagonism. By 1951, Brazilian industry's demand for rubber had grown so large that foreign rubber was imported for the first time. Nevertheless, even by the late 1950s, President Juscelino Kubitschek had little interest in supporting the Amazon region's natural rubber economy. Instead, he sought to meet industry's growing demand by building synthetic rubber mills, two of which were in operation in Brazil by 1965. Although the result was less dependence on foreign rubber imports, the synthetic rubber plants increased Brazil's dependence on foreign oil, the raw material of synthetic rubber, and as the mills were funded by the Goodyear and Firestone companies, caused an unwanted increase of foreign penetration into Brazil's economy (Dean 1987:129, Pinto 1984:128-129). Nevertheless, between 1956 and 1965 the part of the market occupied by synthetic rubber went from less than one percent to approximately 50 percent while total rubber consumption (natural and synthetic) rose 62.3 percent (Pinto 1984:129).

During the 1960s, prices for native rubber declined further due to the increased success of Asian rubber in the international market and the anticipation of rubber plantations in the south of Brazil. By then the extractive rubber industry of Acre was considered a relic of times past and the government oscillated between endorsing programs to subsidize the region's traditional rubber economy and plans to replace it with agriculture and livestock projects. Eventually, in response to lobbying by the natural rubber sector with interests in starting heavily subsidized plantations in the south of Brazil, the federal government instituted an overly protective program of price setting for natural rubber. For example, it raised the price of domestic rubber by more the 150 percent during 1963 compared to an annual inflation rate of 81.3 percent (Pinto 1984:129). Consequently, imported rubber, which had its price regulated by the international market, became even more attractive to industry. As a counter move, the federal government, under Kubitschek's successor, Jânio Quadros, imposed a ten percent tax on all imported elastomers which reduced the consumption of imported rubber and spurred an increase in native rubber production. But the government's plan worked too well. Brazil's production of natural rubber reached 27,000 tons over the country's consumption needs in 1965 and there was no foreign demand for the excess). In the same year, the rubber products industry consumed 36,800 tons of synthetic rubber of which 27,400 tons were produced domestically (Pinto 1984:130-131).

The development of Brazil's highways and its automobile industry accelerated dramatically during the 1960s and 1970s. As a consequence, the production of tires and inner tubes rose an average of 12.8 percent per year during the period between 1958 and 1975 and demand for rubber rose to 263,500 tons per year by 1975. The government reacted with policies more favorable to foreign tire manufacturers by eliminating its former price guarantees for the producers of natural rubber. This reduced the importance of domestic natural rubber once again and encouraged production of even more synthetic rubber (Pinto 1984:133-134). The termination of subsidies for natural rubber threatened to destroy the native rubber economy, a sector that seemed already on the verge of extinction (Dean 1987). In response, domestic natural rubber interests mobilized and lobbied for legislation which would again guarantee the price of domestic natural rubber, this time by making sure that the prices paid for domestically produced natural and synthetic rubber be made equal to that established in the international market. The lobbyists succeeded but under the new program the guaranteed price for Amazonian rubber was not fully adjusted to compensate for the rising inflation rate that had reached 38.8 percent by 1966. The Amazonian rubber economy thus became even more uncompetitive despite Brazil's increasing consumption of domestic latex (Pinto 1984:132-136).

In an effort to improve the standing of native rubber, the Superintendência da Borracha (SUDHEVEA), or Superintendency of Rubber, was created in January of 1967 to take over strategic rubber stocks and to certify the origin of rubber offered for sale. It was also empowered to collect a five percent tax known as Taxa de Organização e Regulamentação do Mercado da Borracha (TORMB), or Tax for the Organization and Regulation of the Rubber Market, on all imported elastomers. Part of the revenues obtained was to be turned over to Banco da Amazônia for loans for starting rubber plantations. In April of 1968, while rubber producers rallied to promote extractivism, representatives of Brazil's rubber products industry, dismayed by the unfavorable adjustment in the cost of its main raw material, demanded that the Congress "admit the extinction of forest extraction," authorize still more synthetic factories, and greatly reduce the tax on imported synthetic rubber (Dean 1987:132, Pinto 1984:139). In spite of these pressures, Congress passed a law in June of 1968 which mandated that the prices of rubber imported to supplement internal production, i.e. imports for which there were domestic counterparts, be equaled to those established for the domestically produced equivalent. In this way the prices paid for rubber consumed within Brazil was adjusted in accordance with the local costs and not according to international rates (Pinto 1984:138). In part, this reversal reflected the restored importance of natural rubber in the light of rapid growth in demand for all rubber which by 1968 had risen beyond the capacity of the synthetic plants (Dean 1987:132).

The new laws signaled the start of an effort to make Brazil self-sufficient in rubber which culminated in the institution of the government's Programa de Incentivo à Produção de Borracha Vegetal (PROBOR), or Natural Rubber Production Incentive Programs, of 1972, 1977, and 1982. PROBOR I was to have increased rubber production by providing four-year loans to extractive enterprises while rubber plantations received twelve-year loans at seven percent annual interest (Pinto 1984:144-145). PROBOR II called for 120,000 hectares of rubber trees to be planted within five years. In addition, 10,000 hectares of defunct plantations and 10,000 hectares of abandoned natural seringais were to be reopened (Dean 1987:145, Paula 1980:39). This phase was followed in 1982 by PROBOR III which involved planting 250,000 hectares of rubber trees and providing loans to develop commercial nurseries, enough to provide a huge rubber surplus for export (Dean 1987:145). The surprising aspect of the PROBOR programs was the fact that, since the days of the Batalha da Borracha during WWII, governmental pronouncements always emphasized the need to gradually reduce the number of people engaged in rubber tapping. But PROBOR intended to substantially increase that population (Pinto 1984:144). Unfortunately, in the late 1970s the international demand for natural rubber slumped along with most other commodities as the global economy proved unable to absorb higher energy costs and as higher prices for oil failed to increase world demand for natural rubber (Dean 1987:161). At the same time, development programs in the Brazilian Amazon as a whole, and especially along the Trans-Amazon highway, were converting former rubber tapping areas into small-scale farms and large-scale ranches and many rubber tappers were leaving the forest and migrating to colonization projects or to urban areas. Consequently, natural rubber output, which had averaged 24,500 tons per year from 1971 to 1973, fell to an average of 19,400 tons per year from 1974 to 1976 despite the government's support programs (Dean 1987:144).

As of 1984 there was still no production of plantation rubber in Brazil. This, plus the high cost of domestic natural rubber and the inability to develop rubber plantations in Brazil because of plant diseases, resulted in a situation which, despite the high cost of imported oil, transformed the Brazilian rubber products industry, in relative terms, into the second largest world consumer of synthetic elastomers (Pinto 1984:146). Most of the demand for natural rubber extracted from the Amazon was replaced by Brazil's production of synthetic rubber which rose from 94,580 tons in 1972 to 190,180 tons in 1978 while none of it went to export (Pinto 1984:145).

In addition, in the 1980s Brazil underwent the worst economic crisis in its history (RNP 1996). Beginning in 1980, the country experienced a period of extreme inflation where general prices increased at ever-accelerating rates. Causes and contributing factors included an increase in Brazil's foreign trade imbalance, increases in international interest rates, further decreases in the international prices offered for Brazil's export commodities which had already reached the lowest level in 50 years, and economic protectionism in the form of non-tariff trade barriers by countries that consumed Brazil's exports (Machado 1988). As a result, Brazilians endured annual inflation rates as high as 5,000 percent, so high that they were exceeded during the period from 1980 to 1994 by only one country, Nicaragua (Romero 1996, RNP 1996, Spatuzza 1997). The effect of all these factors was that in the 1990s Brazil was producing less than one percent of the world's rubber and importing more than 75 percent of its consumption of natural rubber.

The Socioeconomics of Rubber Tapping in Acre

International competition, artificial pricing, competition from synthetics, government regulation, economic inflation, and development programs—all forces over which rubber tappers had no control, coupled with the roller coaster rides of demand and prices, were what rubber tappers in Acre have faced in their struggle to continue their traditional lifeway. These factors were in addition to the poor labor conditions, disease, physical isolation, lack of autonomy, and a inhospitable climate that had already made life difficult for tappers. In the past, the rubber economy of Acre was dominated by the presence of the exploitive labor and credit arrangement called *aviamento* wherein new tappers, called *brabos*, arrived already in debt for their passage to the tapping area. Then the patron charged the tapper even more to set him up in a colocação and provide, food, shotgun, shot, powder, shells, machete, tapping knife, cups for collecting rubber, kerosene, cane liquor, tobacco, and medicines. The patrões monopolized the sale of these supplies to the tapper at inflated prices. Supplies were paid for by credit against future earnings tapping rubber. The patrões also monopolized the purchase of rubber and controlled prices. The only alternative, and a prohibited one at that, was to buy supplies and sell rubber to itinerant traders called *marreteiros* or *regatões*, but credit relations with these were either nonexistent or not any better than with the patrões. The patrões kept and manipulated all records of transactions between themselves and the tappers. Tappers wanted to work off their debt but the patrões kept them encumbered in order to make profits and to keep the tappers dependent.[22] The patrões were in debt to trading houses who were, in turn, financed by export firms in Manaus and Belém. The export firms were financed by domestic and international monopolistic capital that controlled the entire economic system by manipulating prices for both rubber and supplies (Paula 1980) (see Figure 4.1).

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[22] Tappers frequently attempted to counter being short-changed by the patrões by adding extra weight to their loads of rubber by mixing sand and rocks into their latex during the curing process.

By the beginning of the 1960s, most of Acre's rubber estates were already insolvent. At that time, the majority of the patrões were indebted to the Banco da Amazônia (BASA) and were unable to continue buying rubber from tappers and providing them with supplies on credit in the traditional arrangement. The result was that more tappers became completely independent of the patrões and relied solely on commercial relations with itinerant traders who assumed the role of patrões' trading post. Other tappers abandoned rubber production, relocated, and became mostly small-scale agriculturalists. These responses to the breakdown of traditional economic relations in the 1960s were not novel, but mirrored the socioeconomic adaptations of rubber tappers under similar circumstances at the close of the Amazon's previous rubber booms.

During the 1970s, despite the subsidized interest payments and special financing for opening and reopening rubber trails under the federal government's PROBOR programs, the government of Acre looked for an end to economic stagnation and what was considered by many to be the archaic rubber tapping economy that caused it. Toward that end, the government of Acre launched an advertising campaign to attract capital and investors from São Paulo and other rich areas in southern Brazil and abroad, enticing them with the low cost of land for agriculture and cattle raising in Acre, and generous financing via the Superintendência da Amazônia (SUDAM). By 1972, rubber estate owners of the Acre region were selling their groves to well-financed speculators with the encouragement of the local government which was eager for development. The rubber estate owners were glad to sell because, after the tappers had left, their holdings had become unproductive (Dean 1987:145). The result was a large sell-off of Acre's rubber producing forests between 1972 and 1974 and a wave of entrepreneurs who migrated into Acre, buying and deforesting vast areas of land, and evicting squatters, tappers, and indigenous people in the process. The evictions were on such a large scale that it is estimated that 15,000

extractivist families were compelled to migrate out of Brazil entirely and into neighboring Bolivia in order to maintain their extractive lifestyle (IMAC 1991:14).
The process of deactivating the rubber estates by selling the land to Southerners also generated an intense flux in the rural-urban migration of extractivist families who became deprived of their only source of survival, the rainforest. The growth of Rio Branco's population, which rose from 35,573 in 1970 to 138,497 in 1990, is a major index of this migration process (SEPLAN 1986:9, 1993:29). The new arrivals became a drain on Rio Branco's economy, possessing no money and no skills with which to earn a living in an urban setting. Similarly, all of Acre's cities have had their peripheries enlarged by the arrival of ex-extractivists, transformed into day laborers and odd-jobbers little-absorbed in permanent activities (Paula 1980:22).

Despite the fire sale of Acre's former rubber producing lands in the 1970s, approximately 23,200 families were still tapping rubber in the state of Acre in 1980. With an average of five members per family, the number of people then directly dependent on rubber tapping can be approximated at 116,000. But the aforementioned economic crisis of inflation and low demand for rubber in Brazil in the 1980s resulted in bank financing for rubber tapping in Acre being cut as more rubber estates were sold or abandoned.

The Situation in Antimari

Until 1984, extractivism for the families of the Antimari region had remained modestly viable. The residents could still sell rubber and Brazil nuts for a price with which they could buy industrialized goods. Rubber was sold twice each year. The first sale brought enough income to liquidate the family's debt to the patrão or marreteiro. The second sale brought credit which was enough to live on for the next six months and to buy a few extra

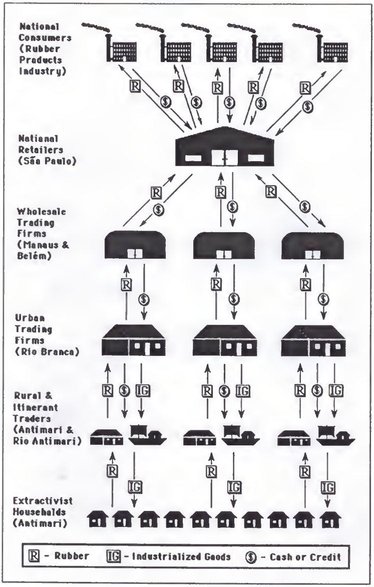
National Consumers (Rubber Products Industry)
National Retailers (São Paulo)
Wholesale Trading Firms (Manaus & Belém)
Urban Trading Firms (Rio Branco)
Rural & Itinerant Traders (Antimari & Rio Antimari)
Extractivist Households (Antimari)
R
$
IG
R - Rubber
IG - Industrialized Goods
$ - Cash or Credit

Figure 4.1. Structure of the Former Rubber Economy.

durable goods. However, in the mid-1980s, with the aforementioned deterioration in rubber prices and raging inflation, traders operating in the Antimari area offered less for rubber and greatly reduced the credit on which local families had depended to pay for supplies until the following extraction season. In addition, traders were increasingly reluctant to carry industrialized goods such as tools, clothes, powder and shot, and medicine, because rural people had no cash and runaway inflation tended to negate any profits on transactions involving payment over time. By 1989, most traders, burdened with increasing transportation costs coupled with the inflation which crippled their ability to extend credit, no longer bought rubber and Brazil nuts along the Antimari river and those who continued to buy rubber and nuts and sell supplies on the Antimari river no longer extended credit. Previously there were still traders doing business, largely on credit, in the Antimari area led by the two ex-patrões, who were responsible for 48.6 percent of rubber purchases (FUNTAC 1990b:23). The old, traditional aviamento system no longer existed. Extractivist families became independent in production and in selecting production activities such as rubber, nuts, agriculture, and livestock raising. But they still maintained strong economic ties with Antimari's two former patrões who continued intermittent contact with local families, mostly in hopes of recouping former debts. An estimated 80 percent of the residents remaining in Antimari no longer tapped rubber, and collected Brazil nuts only for domestic consumption. Instead they devoted their energies to agriculture even though there were few ways to sell their harvests. By 1990, Antimari's traditional socioeconomic system no longer functioned and local residents joined a shift toward autonomy that had started in other areas of Acre as early as the 1970s.

The families of Antimari did not respond to the above-discussed regional changes in the same way as other, more publicized groups such as the rubber tappers of Acre's Xapuri area who, with support from outside organizations, unionized in response to many of the same changes in economic circumstances as faced by Antimari's residents, as well as land conflicts. Xapuri's success in organizing as a community was due mainly to opportunities that, "exist through the national and international alliances formed between the rubber tappers' social/ecological movement and environmental allies and doner agencies"

(Campbell 1996:11). An additional factor that favored the integration of local families into a community was the incursion of roads that decentralized the riverbank as the area's focus and afforded access to more remote areas in the interior (Campbell 1996:39). Thus, the success of their political and economic organization broke traditional socio-spatial organization and created communities in the form of extractive reserves where there had only been isolated households (see Campbell 1996:39-41). Neither Antimari, nor most other remote extractivist areas of the state of Acre, are experiencing the same set of factors that are found in Xapuri's experience, especially regarding the effects of roads (see Campbell 1996). Consequently, neither Antimari, nor most other remote extractivist areas of the state have organized themselves in sociopolitical movements that help rural families secure usufruct rights to local resources, maintain their autonomy in the face of rapid capitalist expansion, and resist migration to urban areas resulting in a transformation from their autonomous or semi-autonomous extractivist existences into proletarianized urban labor as evidenced by the aforementioned flow of rural-to-urban migration that Acre has experienced since the 1970s. Instead, as will be presented in the following chapters, Antimari residents either remained where they were without the benefits of increased sociopolitical and economic organization, or emigrated to new and different lifeways.

CHAPTER 5
ETHNOGRAPHIC OVERVIEW

Introduction

The following overview is a systematic ethnography of the residents of Antimari primarily based on first-hand observation and augmented by data from other sources. It is presented in an effort to understand how all of Antimari's cultural institutions fit together to form a lifeway.

Antimari is considered an extractive area because almost all of its survival depends on the direct relationship with the forest. This relationship constitutes the economic base. However, the region has not been given the legal designation of extractive reserve and thus does not possess defense against invasion and appropriation for logging, cattle ranching, or mining as has been given to approximately three million hectares of reserves in the Brazilian Amazon (Nepstad and Schwartzman 1992).

Antimari is an energetic and hard-working population. Indeed, while local people measure the worth of a woman by how well she cares for her home and children, men are judged by how hard they work. It is perhaps the greatest compliment to call someone a *bom trabalhador*, a hard worker. However, it is not a people staid through habituation to monotonous hardship. Though frugal by necessity, they are not stingy or miserly. Moreover, living with a minimum of education and exposure to life outside of their forest, their scope of worldly affairs is limited but not their interest.

The people of Antimari call themselves seringueiros after the rubber tapping that remains their main income-producing activity and what was the original reason for them living in this remote rainforest area. But now their production strategies have surpassed that of traditional rubber tappers for they have adapted to become a combination of horticulturalists, hunter-gatherers and fishers, as well as extractivists. Their complex production strategy does not easily fit into normal anthropological classifications. Neither does it lend itself to any single definitive category. Because their farming technology does not include the use of animal traction, pesticides, herbicides, or artificial irrigation it can be labeled as horticultural. But calling local residents horticulturalists would deny the importance of extractivism in their lives, both for subsistence and for trade. Neither is it accurate to call them hunter-gatherers because they are not nomadic even though much of their food is derived from collecting. Local residents' activities also fall short of meeting Binford's (1980) criteria for their classification as foragers in that, although they range from a central point to hunt and gather and always return to that point, yields are stored or consumed as needed and not just used as and when procured. They fit into Cashdan's (1989) definition as collectors in that they range out to obtain specific resources in specially organized task groups such as Brazil nut collectors but they fail to meet Binford's (1980) criteria for collectors because they do not establish temporary camps near desired resources, collect them, and then return to their homes. Antimari residents generally do not resort to temporary camps but sleep each night under the roof of their own dwellings.

Antimari is best described as family-level society. Anthropologists have focused on larger socioeconomic aggregations such as extrafamilial groups, moieties, bands and tribes and assumed the nuclear family was almost always subordinated to one of these larger aggregations. While Service (1962:64-66) denies their very existence except in isolated instances, Steward defines a family-level society as an autonomous unit consisting of a nuclear family augmented by a few relatives. He considers them "typologically unique," and attributes their success to cultural ecological adaptation (Steward 1955:102, 120). Johnson and Earle (1987) ascribe the following traits to family-level society:

- Low population density;
- A marginal environment for human occupation with resources scattered, unproductive and/or highly variable;
- Technology consisting of simple tools that are used individually to procure and process food and raw materials with the most common food sources being wild plants and animals;
- Settlement fluctuates between aggregations and dispersion with seasonal settlement located close to resources but changing frequently to avoid resource depletion;
- Social organization is familistic and informal with the main unit consisting of the biological family or extended family with bilateral kinship.
- Production is organized by sexual division of labor within the family and sharing is based on reciprocity among families;
- Territoriality is weakly defined and access to resources is rarely defended;
- Warfare is virtually non-existent;
- Cerimonialism consists largely of family ritual with *ad hoc* ceremonies bringing people together at times but gatherings remain informal and do not involve ceremonial hierarchy;
- Leadership is also *ad hoc* with leaders providing direction when needed for short periods and then reverting to their normal status. The authority of skill or experience does not confer superior standing;
- Consideration of cost and risk minimization are paramount.

Cultural traits found in Antimari adhere well to most the above criteria. For example, their tools consist of hand implements such the axe, hoe, and machete. The only real machine that is commonly used is the shotgun. Chainsaws and motors for boats are absent as are motors or even human or animal powered machines for agricultural production or processing. Kinship in Antimari is bilateral. Names of individuals contain the surnames of both their maternal and paternal lineages. For example, the son or daughter of Francisco Almeida de Nazaré and Maria Lima da Cruz would be named Miguel or Michele Lima de Nazaré respectively. The main social and productive unit in Antimari is the nuclear family and there is little group identification above the immediate household. Division of labor by sex is the only categorization of tasks except for exclusion of the infirm and those who are under three or four years of age. In addition, as their population density is extremely low with the average distance between households requiring a 55 minute walk, the extreme geographic isolation of each family precludes labor organization and production based on a level larger than the nuclear family, except for clearing horticultural plots where the heavy labor prompts the enlistment of extrafamilial labor on a reciprocal basis.[1] As is common among rubber tappers throughout the region, Antimari residents do not demarcate the land which they consider part of their colocações and take no pains, nor is there much need, to guard its resources. There have been no incidents where any group of people have incited violence against any other group in Antimari and the only ceremonies that are observed in Antimari are religious in nature, i.e. those celebrating Roman Catholic holidays and saints' days. Leadership will be discussed in more detail in following sections but at this point it should be stated that, although there are some people who are respected or admired more than others in Antimari, there are no leaders and there is no authority above or outside of the nuclear family. The only trait mentioned by Johnson and Earle that does not apply to Antimari is settlement fluctuation to avoid resource depletion, a trait which may be unnecessary because of such low population density.

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[1] Standard deviation for average walking time between colocações is 20 minutes. Terrestrial distances in Antimari are not measured by kilometers or miles but by walking time. Geographic distance between two points is far less important a factor in travel time and difficulty than is forest density, season of the year, and terrain difficulty.

Antimari's characterization as a family-level society is reinforced by the many parallels between it and Machiguenga family-level social organization as described by Baksh (1984) and Johnson (1989). In both groups the society reflects an absence of many traits commonly associated with horticulturalists. The kinship systems do not greatly emphasize unilineal descent and do not include clans or other larger groups above the level of the nuclear family and marriages are generally matters of individuals' personal preferences in consultation with their immediate families. There are very few or no community-level politics or ceremonies and no multi-household leaders. The concept of private real property is undeveloped and its defense is limited to general and uncodified rules restricting individuals' resource exploitation to their own homesteads or to the commonly held forest and river.

Demographics

Population origins. Research in 1994 revealed that a full 82.9 percent of Antimari's adults were born in the state of Acre but only 14.3 percent had been born in Antimari. The 1994 research also indicated that 58.1 percent of the residents had been at their then-current colocações only since 1990, i.e. a period of less than five years. In addition, 65.7 percent of the Antimari's families had been at their then-current colocações for less than ten years and the vast majority (89.9 percent) started occupying their currently used colocações during the 1980s. Only 8.8 percent of the families had lived in Antimari since the 1970s and only 1.5 percent had lived in Antimari since the 1960s. However, this is not to say that the families had not been living in or near Antimari prior to settling at the colocação where they had been interviewed. A survey conducted in 1989 showed that 68.9 percent of the residents reported that they had come from other colocações in or near Antimari and 31.1 percent reported that they had come from other nearby rubber tapping areas while 24.3 percent reported having come from urban areas (FUNTAC 1989a:28). In addition, in the 1994 survey only three informants (9.7 percent of the households surveyed) reported having come from urban areas, two from Rio Branco and one from Belém, confirming that the most recent migration into Antimari was from other rubber tapping areas than in the past. Therefore, although continually inhabited by non-indigenous people for over 100 years, Antimari's current population has only occupied the area for a few generations.

Population size. In August of 1988, INCRA reported that the Antimari area was made up of 266 people living in 46 households with an average household size of 5.78 members. The survey also showed that slightly over half of these residents (51.5 percent) were over 14 years of age (FUNTAC 1989b:11). By 1989 the local population had increased to 441 people who occupied 80 of the area's 91 colocações (FUNTAC 1990b). But by 1990 there were only 322 residents occupying 85 colocações and by November of 1991, that number decreased to 80 families (FUNTAC 1990b: 1990c, Hebette 1991). At the time research was conducted in 1994, Antimari's population had been reduced to 235 people living at 35 colocações with an average family size of 6.71 people per household. The rapid decline in population was due to emigration and is a major focus of this dissertation.

Population composition. Surveys conducted in 1994 indicated the following data about the composition of Antimari's population:

- Out of the 235 member population, 152 (64.68 percent) were under 20 years of age and 83 (35.31 percent) were 20 years old or older;

- The average age of the male household heads was 42.06 years (std. dev. = 11.91, min. = 23, max. = 70) and the average age of the female household heads was 36.89 years (std. dev. = 13.21, min. = 13, max. = 66);
- The average quantity of people per household was 6.71, (std. dev. = 2.64, min. = 2, max. = 15);
- The average quantity of adults (people 20 years of age or older) per household was 2.34 (std. dev. = 0.91, min. = 1, max. = 5);
- The average quantity of people under 20 years of age per household was 4.34 (std. dev. = 2.52, min. = 0, max. = 11);
- The adult population (people 20 years of age or older) was 56 percent male and 44 percent female;
- The population under 20 years of age was 47.3 percent male and 52.6 percent female.

The age of adulthood was set at 20 years only in order to compare with previous socioeconomic and demographic studies of Antimari which used this age to discriminate between adults and children.

Population density. At the time research was conducted for this study in 1994, the 235 people living in the 669 square kilometer area of Antimari yielded a population density of only 0.35 people per square kilometer. This is in contrast to 1989 figures which revealed that the population of 441 at that time lived at a density of 0.66 people per square kilometer, reflecting the 53.3 percent decline in population over that five year period. The 1994 population density of Antimari makes it one of the least densely populated areas of human habitation on the planet. As a comparison, the population density of the state of Acre was approximately two people per square kilometer and Denevan (1976:226) conservatively estimates that, at the time of contact, the average human population of the upper courses of Amazonian lowland forest rivers such as Antimari at between 1.2 and 14.6 people per square kilometer (IMAC 1991:14).[2]

In Antimari there is no single scarcity limiting population growth. However, their extraction-based life style prohibits large or dense populations. Moreover, Antimari residents have a manioc-based horticultural system that includes rice, fruits and other food crops. Beans are conspicuous by their absence. The bulk of dietary protein is derived from hunting, fishing and some livestock production. Accordingly, the population cannot be large or dense or it would have to become migratory in the face of declining yields per unit of effort in protein acquisition (see Denevan 1966 and Gross 1975).

Population distribution. It has long been recognized that the form, size, and fixity of human settlements bear a definite relationship to their modes of exploiting the natural environment to provide subsistence and that spatial arrangement of those resources can significantly influence human settlement patterns (Jochim 1976:48, Murdock 1969:129). Resource availability varies in its importance regarding choice of household location according to peoples' level of security. The greater security or economic value of a resource, the greater its influence on household location. Location in Antimari is a result of decisions by families based on an evaluation of the following factors in an effort to maximize socioeconomic goals:

- Colocação availability and condition,
- Age and condition of the colocação's dwelling,
- Presence or lack of rubber and Brazil nut trees,
- Availability of hunting and fishing resources,
- Horticultural potential,

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[2] Most of the Amazon was 0.2 people per square kilometer while the density overall for South America's tropical forests around the year 1500 is estimated at 0.23 people per square kilometer (Steward and Faron 1959:53-54). In contrast, 1996 population densities of the United States, England and Japan were about 50, 260, and 1,500 people per square kilometer respectively.

- Proximity to relatives,
- Availability of potable water,
- River access,
- Distance to trading posts, schools, and health posts.

The uneven distribution of resources is important to consider when analyzing settlement choice/distribution. In Antimari, the interior affords better hunting and gathering. The riverbank provides better fishing, transportation, articulation with other people, and transportation up and down the river and out of Antimari to the city.

Of the 91 colocações that were ever established in Antimari, 36 were located along the river and 55 were located in the interior. Figure 5.1 shows the distribution of these colocações and the forest trails that connect them to each other and to the area's three socioeconomic foci of Laranjal, Mapinguari, and Limoeiro located on the river.

In 1990, approximately 56 percent of the families lived in the interior, i.e. away from the river (Cavalcante 1990:4). By 1994, of the 35 families remaining in Antimari only 25.7 percent (nine families) lived in the interior while the other 74.2 percent lived along the river. The names of colocações that were still occupied in 1994 are underlined in Figure 5.1. Families who had lived in the interior have mostly abandoned that area and either moved to riparian colocações or emigrated. By the time the population was surveyed in 1994 there were still a few families living in the interior at colocações located north of these three centers but occupation was limited to colocações within a few hours walking distance from the river. As stated earlier, the average distance between colocações in the interior is a 55 minute walk although this varies considerably.

Outlying colocações, especially those to the south of the river and those in the remote north had been abandoned for many years. Informants related that the colocações to the south were less desirable because they produced fewer Brazil nuts and those to the extreme north, although containing the best hunting in the region, were considered too isolated and too far from the river for occupants to transport extracted goods or have access to the trading posts, schools, and health posts located along the river.

Kinship, Family Structure and the Division of Labor

Families in Antimari are patriarchal with the oldest productive male household member having authority even over an older non-productive male or female. It is he who is responsible for the family and the colocação and represents them politically and economically outside the family. Men are also responsible for the safety of family and livestock on trail and at home. He or an adult son must ward off the predators such as birds of prey, jaguars and other large cats that frequently threaten livestock in Antimari. The concept of male responsibility is evident even in the case of siblings as brothers are held responsible for the welfare of their sisters when away from their parents. It is the male members of a group who must paddle the canoe. Older sons usually do the paddling when traveling by water and carry younger children (but not babies) and heavy burdens when traveling by land.

The male head of household is also responsible for the debts of the entire family except those debts incurred by other adult male members of the household. Community affairs are for the most part the male's domain more than that of the females. Men buy and sell and make agreements with others outside of the household. Of course, male heads of households are not autocrats and do consult with and plan with their mates regarding household matters. It is the adult female, usually the authority male's mate, who usually supervises and manages the household and the day-to-day activities of young children. The male household head does not usually interfere in her domain.

The colocações' land, its resources, and family farming resources such as livestock and crops, are usually owned by the family as a unit. If title is held to the land, it is usually

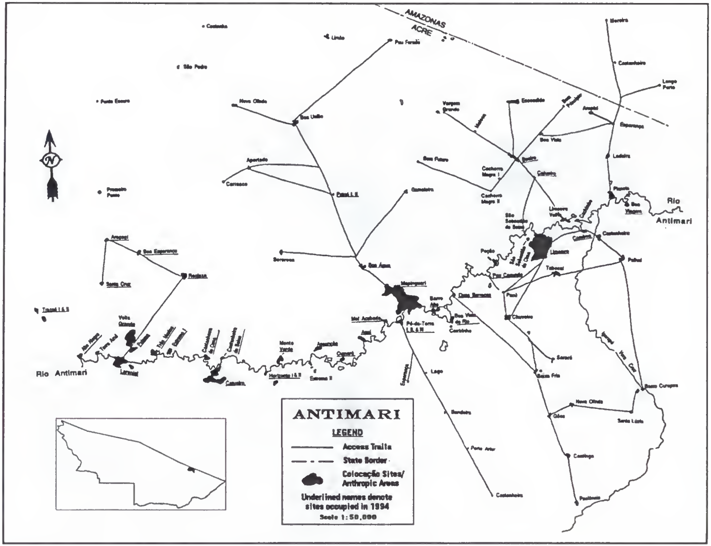

Figure 5.1. Distribution of Colocações in Antimari

in the male household head's name unless he dies and ownership transfers to his widow. There are cases where a widow took a new male cohabitant and the colocação was still regarded as hers and her children's but this is rare.

Men have weapons, fishing nets and bee hives that women do not use. Women have clothes and sewing machines, pots and pans that men do not use. Handlines and hooks for fishing, the grinder used for coffee and corn, the household's mud stove, cane press, manioc scrapers and griddle, and hand tools are items that both men and women use.

The husband's assistance to the wife in household chores is usually minimal and is generally limited to yard work and repairs on the dwelling or the stove and not to performing tasks that are usually regarded as women's domain. Wives' assistance to husbands in extra-household chores is usually minimal and pertains to lighter horticultural work and not performing tasks that are usually regarded as men's domain. However, there is one extraordinary woman, Dona Rosinha Candida da Silva, of Colocação Deixa Falar, who has tapped rubber and hunted large game to support her family after her husband was critically injured by a caiman. She is highly respected by both men and women for taking on these additional family duties but her disabled husband has lost esteem because he no longer supports his family.

Women do not travel much alone. They do not go from colocação to colocação alone and do not travel on trails or on the water at night alone. Women are not found alone with members of the opposite sex that are not related to them. Men spend long hours away from home, frequently alone, tending crops, tapping, hunting and fishing. Women do not.

Life Stages

Pregnancy. There is not much stigma attached to women being pregnant before marrying or cohabitating with a man. However, it is considered best for her to cohabitate with the father after the child is born. Cohabitation can be with the father's family or independently if the couple has the means by which to maintain a separate household at another colocação.

There are no secular rituals such as a baby shower associated with pregnancy. Nor are there many prenatal precautions undertaken by the perspective mother. Likewise, there is no evidence of couvade. However, there is a proscription regarding standing close behind a pregnant woman as doing so is considered a display of malicious intent toward the unborn child. It is interesting to note that, aside from some concern that women might magically taint hunting and fishing gear during menstruation, supernatural powers are attributed to some women of Antimari only when they are pregnant. Some pregnant women are thought to be able to kill snakes by merely looking at them while others are believed to be able to heal by touch. These abilities do not apply to all women but are attributed to some after specific incidents that occurred while they had been pregnant.

Birthing. There are no midwives in Antimari but some women are regarded as having some special knowledge of birthing and their advice is sought over that of the health post workers, all of whom are male.

Local residents used to deliver their babies in Antimari. However, most women now deliver their babies in hospitals or clinics in Rio Branco. If the prospective mother does not travel to the city of Rio Branco to deliver, the birth is assisted by the woman's mother and an elder female if possible. Men are not involved in the birth process.

Neonates. Names are usually given to newborns at the time of birth with names usually being chosen by the mother, especially in the case of female children. Many families choose one name as a theme for all their male children and another name as a basis for the names of all of their female offspring. All children are then given names that are permutations of the base appellations. For example, in a single family the male children may be called Valdemir, Valdenizo, Valdeni, and Valdizo while the female children may be named Francisca, Francimara, Francileuda, Francivalda and Francilda. Later in life, nicknames are given to people and used constantly. The nicknames generally reflect a personal characteristic of the individual. In Antimari one man is nicknamed Soldado (Soldier) because he had served in the army and another man is called Cabeça de Onça (Jaguar Head) because of the general consensus that his face resembles that of the large forest cat.

The custom of assigning godparents is upheld but, as there are few elites to whom residents can appeal, peers of the parents or grandparents are more commonly used.

Babies are carried in women's arms, not on the mothers' backs or in slings. They are breast fed by their own mothers on demand and fed premasticated manioc and meats before weaning. Both babies and toddlers are bathed at home instead of in the river or on river bank as most older people.

Childhood. Children from birth to about four years of age are doted upon by older family members and have no responsibilities. They receive a great deal of attention and it seems that the adults always have time for them. At about four years of age, children start to imitate the actions of their parents in the everyday tasks of living and thus start to help the household. For their efforts they receive positive but not overt reinforcement. An approving glance, not a verbal thank you or a fuss, is the normal response from elders.

Children are not regarded as an economic burden because of the labor they contribute to the family. Young boys are sometimes asked to perform some tasks that are traditionally the purview of females such as fetching water but they usually assist older males in traditionally male-oriented activities such as livestock tending, horticulture, hunting and fishing. Young girls help their mothers with light household chores. Teenage boys help their fathers at the heavy labor of horticulture, tapping rubber, livestock tending, and colocação maintenance. Teenage girls usually help their mother with most of the heavy tasks of household chores including hand washing laundry on the river bank or at the water hole, food preparation, and child care.

Children do not hire out but remain labor assets to their own families. Only one young man in his early twenties left his family to work on a nearby ranch and another young man went to work for FUNTAC. Some teens and young adults have elected to remain in Antimari out of obligation to their parents despite their strong desires to move to the city. Some single girls in their middle and late teens were persuaded to become household labor in the city but did not fare well.

Discipline. The children of Antimari do not seem to need the kind of discipline seen in Western culture. Although all households but two in Antimari have children, I never observed a child being disciplined by being yelled at or struck. Nor did I see children whose behavior was in need of either disciplinary tactic. At most, a simple word from an adult or older sibling was usually sufficient for correction. If first admonitions proved insufficient, the reproach was repeated and repeated until the errant child's behavior improved.

Adoption. There are adult deaths in Antimari, principally women dying from illness or pregnancy and men dying from accidents. It is impossible for a single parent to maintain a household on a colocação. The main productive activities of extraction, hunting, fishing, and farming take place outside of the home so a single parent cannot take care of the household and children and provide for their support. Consequently, the death of a parent usually means the breakdown of the nuclear family living independently on their colocação. If an extended family lives in Antimari, surviving members of the nuclear family usually abandon their colocação and take up residence with their relatives. However, if there exists no extended family with the means to take in the survivors, the remaining parent usually abandons the children to the care of other local families. But there is no shortage of people who want to take in the children of the deceased. For example, Luiz of Colocação Bom Destino was four years old in 1994. His mother died and his father could no longer care for him. The family of colocação Coloral took in the child, who was the same age as their younger daughter, and later legally adopted the child by appearing before a magistrate. Now the boy is inseparable from his new sister.

Another case is of a woman who died after a miscarriage and subsequent profuse bleeding combined with preexisting debilitation from chronic malaria. Her three children survived her and, as the father could not care for them and still be productive in his colocação, the children were taken in by Antimari families.

Choosing a mate. People in Antimari choose their own mates. First and second cousin marriage, or more frequently, cohabitation, are permitted in Antimari, as are large differences in age between mates if the man is older than the woman. However, since the rise of the Pentecostal faith in the area, local families have divided into two endogamous groups based on religion. Pentecostals are adamant in their endogamy and expel followers who marry Catholics. Catholics are not as vigorously opposed to marriage between Catholics and Pentecostals but consider the union as bound to be problematic. There has been tension in a few cases because Pentecostal families disapproved of their children becoming romantically or sexually involved with Catholic residents but with such a small and isolated population it remains difficult to be as selective as mores dictate.

Young people usually marry or cohabitate with local people from nearby colocações. They meet, court, and have sex on trails to and from colocações or schools and trading posts along the river. Having extensive duties that require staying on the colocação, young male suitors often make excuses to visit perspective mate's colocações. Consequently, escorting me from one colocação to the next was a popular chore for unattached males, especially if the trek involved staying overnight with the neighboring family. More than once the early morning departure from one colocação to another was delayed by a guide who wanted to be sure that he would not have time to return home by nightfall. Females never go to perspective mates' colocações for courting purposes and there are never any overt signs that a courtship is underway.

Young people do not go on dates, i.e. private or public outings for the sake of being together, as there are very few public gatherings or other opportunities for them to court and they are always in the presence of others. If accused of being interested in each other the couple will usually not admit the relationship until it is fairly established because if they confess their affections they usually must endure being teased by friends and family, especially if caught being intimate in private. Courtship is secretive and families are not supposed to know or let on that they know of the couple's interest in each other until the male suitor asks the female's father for permission to marry or cohabitate with the promise to formally marry the next time the priest comes into the area. Despite this secrecy surrounding courtship, if the female's parents approve of the match, they eventually arrange some pretext by which the couple can be alone for short periods of time. Parents usually know their daughters' suitors since the latter's boyhood and know his family and agree to the union. The girl's mother's wishes on the subject are voiced through the girl's father provided the parents are in agreement. However, if the girl's parents do not agree to the union the boy frequently "steals" the girl away to another colocação within Antimari--usually that of the boy's family or a new colocação that he has prepared. The physical relocation makes the "marriage" a *fait accompli* and the girl's family eventually accepts the union. If not, the woman's family may sever relations with her and the couple may emigrate but there were no reported cases of the girl's family trying to retrieve her by raiding.

As mentioned above, the man may have made some proper preparations for a new life with his woman. He may take her to his family; open a new colocação, preferably adjacent to his natal family; or reopen an abandoned colocação, usually located in the interior due to lack of unoccupied sites along the river.

Marriage. Only 6.3 percent of the heads of households considered themselves unmarried. The remaining 93.7 percent were either legally married or cohabitating. Most of the unions among Antimari residents are monogamous. Some older men in Antimari have wives and families in Rio Branco or elsewhere whom they have abandoned. Despite the legal proscription, these men consider themselves divorced and have started new families and new lives in Antimari. There is also one household wherein two sisters share a husband but they explain that they do not consider it a bigamous arrangement because one of the sisters married the man across the frontier in Bolivia and the other sister married him in Brazil. They have been living this way for over 30 years and together they had a total 24 children who lived beyond age one year. However, and despite the above case, people generally do not share mates.

Unmarried sons and daughters live in their parents' dwellings. Upon marriage they form a new family unit and usually move to and refurbish an abandoned colocação.

Sometimes the newly-wed couple lives with the man's parents, takes over the majority of the household production activities, and cares for the elders.

Weddings are usually performed by an itinerant Italian Catholic priest who visits the area twice each year. The priest refuses to baptize children unless their parents marry so there is this incentive to marry with a religious ceremony although it is not recorded in civil registers. There is no dowry, no exchange of wealth, and no gifts given to the new couple except when a man gives part of his colocação to his marrying/cohabitating son in an effort to help the new family get started in life. Couples do not enjoy a liminal period such as a honeymoon between being single and being cojoined. Marriage or cohabitation immediately settles the matter of who will be a resource and provider in the case of a girl who is pregnant.

Assembly of God believers must consult a church representative prior to marriage. The representative may in some cases act as a secret intermediary and obtain the woman's family's consent to the union on behalf of the prospective groom. Among Assembly of God residents, couples seldom elope if their parents do not agree to the union, there is less cohabitation without marriage, and courtship practices are more strict. For example, a resident named Osvaldo wanted to marry Alcida, a 17-year old girl at Colocação Terra Grudento. Osvaldo is an Assembly of God believer and she is not. He was not permitted to sleep in the Terra Grudento house while courting or while acting as my guide and this presented logistical problems as distances between colocações are hours apart. Osvaldo was the first person in Antimari to have presented a finger ring to his intended wife while proposing marriage as most extractivists cannot afford such luxuries. The ring gave her much prestige among her peers. Such rings are traditionally worn on the third finger of the right hand until marriage, at which time they are moved to the third finger of the left hand.

Elders and retirement. In Antimari, there is deference to the aged even if they are not of one's own family. Elders are cared for by younger on-site relatives and left free from labor responsibilities. If grandparents are living at a colocação, a small house is built for them or they continue to live in the old one while the younger family, usually headed by the oldest adult son, builds a new house close by. Some of Antimari's older people, especially those receiving a pension from being a Soldado da Borracha, prefer to move to the city if possible because, in addition to a lack of adequate medical care, life in the rainforest is physically arduous even for the young.

Elders are obeyed by their children regardless of the age and even if a son has already become head of the household. But elders seldom impose their will in the everyday affairs of their adult children or the household once their children have assumed authority and responsibility. When family elders retire from being the head of the colocação, the new household heads are in full command and have full decision-making authority but go to their elders for counsel and would feel ashamed or embarrassed to have them know that they, the children, did something of which the elders would not approve.

Death. In Antimari, survivors of the deceased are spared dealing with the stressful and costly cultural and legal obligations frequently found surrounding a death in modern Western society. No embalming takes place, no coffin is made or purchased, no burial plot needs to be purchased and no headstones are carved. Upon the death of a local resident, a health post worker makes note of name of the deceased and the date and emic cause of death. No public notice is given outside Antimari via radio or newspaper. Outsiders who need to be informed of the death are told orally or by hand-carried written message. The deceased is buried quickly after being laid on the floor of the dwelling and covered with a mosquito net to await being visited by people who are close enough to travel by foot or canoe. Friends and relatives visit the colocação of the deceased, pay their respects, and comfort the surviving family members. However, no wake is held.

Adolescent and adult Antimari residents are usually buried at one of three communal burial plots. One is by a disused corral at Limoeiro. It is 20 meters by eight meters separated from the corral and other grounds by a rail fence. It is choked with weeds and bears one lone, two-foot high, wooden cross made of sticks which is at the head of one grave. No other markers exist but residents remember more or less where people are buried. There is no gate by which to enter and the plot is unadorned and unmarked. The other plots are similarly plain. However, people are not always interred at one of these three places. Babies and small children who die in remote colocações are interred at the family's colocação. In any case, people are interred without much ceremony. No markers are placed over grave sites nor are the graves of the dead visited. Most people are reluctant to approach the cemetery areas even during daylight and while remaining within sight of other people. Many expressed fear of visiting the cemeteries when I asked to see them. All of the women and some of the men refused to go with me, citing fear of the dead.

Daily Routine

Meals. Women cook with help from their daughters. Meals are served on plates set on the floor as there is a table in only three of the dwellings in the region and two of those had no chairs or benches on which to sit at the table. One can of water and one metal cup is placed in the center of the floor for diners to drink. If the family does not have enough plates to accommodate the entire family, eating is by social rank which starts with guests, goes through the father, mother, and then the children according to age to the youngest that is able to eat solid food. The only eating utensils are spoons but they are really the only implement needed because all food is served as bite-sized pieces or can be eaten while being held with the fingers. The evening meal is usually served after sunset and is illuminated by one or more small jars of kerosene with wicks protruding from their lids. As they always appear after sunset, cockroaches scurry across the floor where the meal is being served. Although tolerated on the floor, they are quickly removed if they climb on plates or spoons. Likewise, household dogs and cats are passively kept from the eating area.

Breakfast usually consists of some leftovers from the previous evening meal served with coffee and perhaps a banana. It is very informal and is eaten while standing in a group and having quiet conversation about the upcoming day.

The mid-day meal is small or may be skipped entirely if household members are engaged in work far from the dwelling. It consists of coffee and manioc fried in animal grease and accompanied by fruit if available. It is eaten very informally with family members standing or lounging on the floor and coming and going as they please instead of everyone stopping all other activities in order to dine together as a singular event.

The evening meal is larger and is accompanied by open conversation for its own sake and for talking about work or household matters. The food is game meat and rice or manioc. There are no vegetables, no bread or other baked goods, and no industrialized foods except salt.

Etiquette

As in any culture, the people of Antimari have standards of conduct as part of their array of social customs. In Antimari, courtesy is shown through one's actions more than through words. For example, as most family dwellings do not have walls on all sides or doors of any kind that would enable one to knock to announce one's self, visitors clap their hands and wait for a response before intruding on the resident family. Good manners also mandate that visitors remove their muddy footwear before entering a dwelling even though the occupants will invariably insist that one need not bother. Likewise, it is considered polite to leave weapons at the threshold of a dwelling instead of entering armed even if one is a family member.

As the families of Antimari live virtually without walls, etiquette demands that they simply take no notice of some of the business of everyday life that goes on around them. For example, sexual relations are considered very personal and not the subject of polite conversation. Lovemaking overheard at night is not commented upon at the time nor afterward. In addition, when one leaves the company of others to relieve one's self in what constitutes the only toilet facility at colocações, i.e. the nearby forest, people never converse with the departing person or ask where he or she is going or why.

In contrast, other rules of etiquette are designed to ensure that certain activities are not done merely with one's own self in mind. For example, when departing a group or a colocação while traveling, one does not merely say good-bye. Instead, it is proper to invite all to go with you. One does not say, "Well, I have to go upstream now. Thanks for everything." Instead one should say "let's all go upstream! Come along with me!" People then decline the invitation saying that they must stay for such-and-such a reason. One then expresses disappointment that they cannot go along, thanks them for their hospitality, and then says a separate good-bye to every individual present starting with those of highest social rank such as elders and household heads.

Other rules of conduct govern social relations. For example, individuals of the opposite sex are generally avoided if the situation would put one alone with them. Toward this end, women will not usually be alone with a man unless he is her kin or husband.

Husbands and wives address each other by their given names or by no name at all and do not use pet names or private names. A woman might call her husband by his nickname if he uses only the nickname as his public name, as is the case in over half the men of Antimari.

Public displays of affection, either verbal or physical, between adults of the opposite sex are considered bad manners and few words of endearment are used among adults. Similarly, not many verbal courtesies are used in Antimari. No one says "please" or "thank you" with much frequency. To do so puts the relationship between speaker and spoken to on a much more formal level and such constant politeness is regarded as stuffy and pretentious. An analogy can be drawn between the constant use of formal manners of speech in Antimari and guests being entertained in formal dining or sitting rooms of homes in the United States. Honored guests and dignitaries are spoken to using "please" and "thank you" and "excuse me" in Antimari but such language is considered unnecessary among friends, just as distinguished guests and important people are entertained in the formal rooms of homes in the United States but true friends are entertained in the kitchen.

There exists a system of rules for conduct outside of the home as well. For instance, as most people bathe daily in the Antimari river, if people are encountered while bathing along the river or at water holes local residents act as if they did not see the person but quickly leave them to their privacy. I was "caught" one afternoon by two canoes full of women and children who were paddling by while I was bathing on a muddy riverbank. As soon as the group ascertained exactly what they were looking at, i.e. an embarrassed and naked man sitting too far from his clothes to make a dignified sprint to the sanctuary they could provide, they all became interested in watching for birds along the opposite bank as they paddled out of sight around a bend in the river. Moreover, after I dressed and hiked to the colocação that I was visiting only to find that the group had stopped there for a visit, my chagrin was mitigated by their acting as if nothing had happened.

The area's low population density and the vastness of the forest and river ensure hunting grounds for everyone. Nevertheless, certain proscriptions apply to hunting and fishing such as rules against disturbing another's tail markers; fish nets, traps, or trot lines; never hunting on another's colocação unless invited, and never hunting with dogs where others want to hunt as the use of dogs is considered disrespectful of nature and is thought to ruin the area for further hunting. Likewise, one should not use another's dugout or paddle without permission except in an emergency. Other rules that apply to hunting are based on safety. For example, one should never place guns with trip-wires on footpaths or trails and always retrieve any such passive hunting rigs by dawn of the following day.

Knowledge and Education

As the vast majority of Antimari's residents are descended from generations of rubber tappers, they are experts at living in the rainforest and extracting a living from its resources. They possess an impressive body of common knowledge regarding their traditional culture and the environment to which it has adapted.

The knowledge that is used in making a living in Antimari is not recorded or systematized in any way. Traditional, practical knowledge is not taught as much as learned by observing the examples of elders. Horticulture, hunting, sewing, cooking, child care, and all the other skills necessary for successful life in the forest are all taught at an early age by having the child participate in the activity. However, there are no specialists in Antimari and everyone is dependent upon the same skills for survival. The only traditional esoteric knowledge recognized in Antimari has been that of dug-out canoe making and magical healing.

Recently, with the establishment of health posts and schools in the area, teaching school has become a part-time specialty for four local residents. The teachers are local people who are literate. They are paid by the state at a rate of 1.5 times the official minimum salary. Two of the teachers took the job because they lived near the school sites, were literate, and were interested in the cash income. The third teacher is of special note. Dona Rosinha of Colocação Deixa Falar accepted the job of teaching at the area's most remote school because she was the only literate person in the vicinity. Although her colocação is a one-hour and ten-minute trek away from the school, she teaches three times per week. This is the same Dona Rosinha mentioned earlier who has four children to take care of and performs most of the family labor formerly done by her husband before he was attacked and severely disabled by a caiman. Thus, Dona Rosinha has assumed the responsibility of teaching in addition to tapping rubber, hunting, tending crops and even occasionally hunting large mammals for the family's meals.

In view of the decreasing viability of traditional extractivism as a lifeway for future generations, formal education is of increasing importance to the residents of Antimari. Unfortunately, the majority of Antimari's population is illiterate. A survey conducted in 1989 revealed that only 9.96 percent of the population could read and write (FUNTAC 1990b:20). Residents who did know how to read at that time learned prior to their arrival in Antimari because until recently there were no schools in the area and travel time to the closest school was over four hours for all but two of Antimari's families.

The lack of schools was one of the problems first addressed by FUNTAC when it became interested in the Antimari area on behalf of the state. Starting in 1991, three schools were built at intervals along the Antimari river at locations that would afford the best access to the largest number of inhabited colocações. The schools are without electricity, plumbing, water, play equipment, chalk boards, maps and other educational equipment. Nevertheless, when in use, grades 1 through 4 are taught all together in a single room by a single teacher, from 7:00 a.m. until 11:00 a.m. on Mondays, Tuesdays, and Thursdays and a snack of rice, macaroni, or crackers is provided by FUNTAC. There have been some attempts to offer classes to adults on Wednesdays and Fridays. However, most adults found it impossible to fit classes into their work days.

The text used to teach all students is "Cartilha de Alfabetização de Adultos" (Adult Literacy Primer) Versão 1990, 2nd. edition, 1991 by Regina Hara and Maria Gracieto Zaire Ibañez, for the Secretaria de Educação e Cultura do Estado do Acre with advice from Centro do Trabalhadores da Amazonia (CTA) of the Acre and Purus river valleys. Because material containing references to urban life, electricity, mass transportation and other elements of industrialized society have little meaning and no relevance to the people of Antimari, readings are about their own extractivist life in the forest and include topics such as "How to Prevent Some Diseases," "The Work of the [Rural Workers'] Union," and "A Small History of Rubber," as well as maps of Acre and Brazil. Themes include a brief biography of the extractivist movement leader Chico Mendes, labor organization for rural people, nature, and rainforest conservation. The primer also includes photos of extractivists at work and vocabulary words pertinent to extractivist life such as *mata* (forest), *borracha* (rubber), *castanha* (nut) are emphasized. Most of the children love school, especially learning to read, and are very proud of their growing literacy —an accomplishment that is relied upon by illiterate parents and other family members. More than once when I arrived at a colocação the children, who knew of my impending arrival, had perched themselves a conspicuous places in front of their dwelling with some printed matter in their hands in order to show off the fact that they could read.

Unfortunately, because of the area's extremely dispersed settlement pattern there are still problems regarding access to schools. Families in the interior regions live too far from any point along the river to make school attendance practical. In addition, many river bank colocações are isolated by flooding during the rainy season thus prohibiting residents from attending school. But literacy and numeracy rates are improving even for the adults of Antimari. Surveys conducted in 1994 revealed that 60.9 percent of male household heads and 51.4 percent of female household heads could write their names. In addition, 37.0 percent of male household heads and 42.9 percent of female household heads could read and write. Survey data for this period also show that 54.3 percent of male household heads and 11.4 per cent of female household heads could do basic arithmetic. However most of the increase in literacy and numeracy rates must be attributed to immigration by literates, not to local school attendance.

Information and Communication

Residents possessing radios can receive news and information via short-wave broadcasts twice each day at 1:00 PM and 8:00 PM through a program called Radio Difusora Acreana at 488.5 Mhz on the 60 meter band.

A favorite daily radio program is *Mensageiro* (messenger) which broadcasts personal communications and announcements from people in Rio Branco to those in outlying areas. On any given day one can hear messages such as requests for relatives to go to Rio Branco to visit sick relatives or announcements that so-and-so will not be able to meet their party at the highway leading into the city. Being the only means of communication with Acre's rural regions, the broadcast is also used to communicate news, national soccer scores and malaria test results from the city to local health post workers who can then treat local residents with the appropriate medicines. Short-wave radio is also used to broadcast religious programs from the Assembly of God Church in Rio Branco. However, less than half of the families living in Antimari own radios as they are expensive to buy and do not well endure the onslaught of humidity and insect infestations that occur in the forest. In addition, the radios run on D-cell batteries which are also expensive and which do not last long. With more of local children becoming literate, residents are now able to send written messages out of Antimari to relatives in Rio Branco whereas before they could only receive messages by listening to the radio. Written notes were sent out of Antimari via anyone who has river transport, especially this researcher.

But for residents of Antimari, communication is more between colocações than with the outside world. There is more household-to-household communication among the riverine colocações than among those of the interior or between those of the interior and those of the riverbank. Nevertheless, intracommunity communications are surprisingly fast despite distances and lack of rapid transportation. If an event of community interest occurs, be it news of who is sick, who had a fight with whom, or the arrival of outsiders or just gossip, word of mouth carries the news along the river and into remote regions with startling speed. People who travel the river stop at colocações along the way and exchange news. River bank residents meet with people from the interior at religious gatherings, health posts, and trading posts and information is always exchanged. For example, when the boat in which I was traveling had a collision, caught fire and sank, the entire area knew of the event so rapidly that as I arrived at each subsequent colocação people already knew the details of the incident. I was delayed due to the calamity but it is still surprising that the news arrived before me despite the fact that I was traveling by motor boat.

Travel and Transportation

Transportation within Antimari is by foot or by canoe. Currently used dugouts are adaptations of the indigenous watercraft (Tocantins 1984:32). The only local man who is skilled in canoe making charges the equivalent of US $41.67 for each canoe—a fortune for people who have no cash. There is no periodic or scheduled water traffic on the Antimari river and the area is without practical or reliable transportation for goods or people. Itinerant river traders do enter the area aperiodically but they charge high rates for passengers and seldom go directly between Antimari and the city of Rio Branco. This limits Antimari's participation in markets because local people have no way to transport for sale locally produced commodities such as eggs, honey, oranges, limes, bananas, game, medicinal plants, or artisanal goods.

The lack of independent transportation also plays a large role in community health. It is impossible to treat complicated medical problems in Antimari and, with no practical transportation in and out of the area, local residents suffer and sometimes die without proper medical treatment. For example, in 1990 an otherwise healthy young woman died in Antimari due to complications of childbirth merely because there was no way to transport her to a medical facility. She literally languished for two days on the riverbank hoping a boat would pass. When none did, she bled to death while saying good-bye to her family and friends who were at a loss to help her. According to interviews with families who emigrated from the area, the lack of adequate transport has been one of the leading factors in families' decisions to leave Antimari.

Crime and Violence

There is comparatively little crime or violence in Antimari. The fact that residents have few possessions of monetary value, coupled with the great distances between households, seem to contribute to the low incidence of crime more than religious proscriptions or fear of retribution or prosecution. There has been only one shooting in the remembered past and that involved a man killing another man for copulating with his wife. Petty theft also occurs on rare occasions. One family recently moved from one colocação to another because the male household head had created bad feelings with his neighbors by constantly stealing their horticultural tools such as axes and hoes. There is little that can be done with transgressors. Antimari is located very far from any military, state, or municipal law enforcement apparatus and those responsible for maintaining order in that part of the state of Acre are not interested in what happens deep in the rainforest. No official law enforcement or civil or legal authority exists in Antimari and no one is in authority in the entire area. Regardless of the offense, no local residents have yet to be brought to any kind of justice authority for any offense. For example, when an Antimari woman strangled her baby to death by wrapping a rag around its neck, she confessed that she did so because the baby was fathered by a man who was not her husband. Despite the confession, she was not brought to any formal justice. Local women condemned her verbally and urged the woman's mother, with whom she had been living, to denounce the woman to the Rio Branco police but the mother refused. Shortly thereafter, the woman became extremely sick and was expected to die so the matter was dropped. Although she eventually recovered from the illness, no one sought her prosecution for the murder.

There are some residents of Antimari who have had conflicts with formal legal authorities for acts committed outside of the Antimari area. Most have been charged with either theft or prostitution but there are murder charges awaiting some people if they leave Antimari. However, because of its remote location and difficult access, legal authorities are not interested in pursuing fugitives into Antimari and the local residents do not object to the fugitives' presence as they are relatives of local residents in over half the cases. Some of the fugitives were born and grew up in Antimari and had gone to the city to seek a better life, gotten into legal trouble in Rio Branco, and returned to the area.

Drink, Drugs, and Tobacco and their Use

Despite the omnipresence of fruits, honey, sugar cane, rice and other potential base ingredients, no alcoholic beverages are produced in Antimari. Instead, crude isopropyl alcohol is frequently consumed after adding a small amount of lime juice although it causes medical problems such as chronic gastritis.[3] Cachaça, an industrially produced cane liquor similar to rum, is available at the Mapinguari trading post but residents shy from its cost even though they can purchase it on credit. Drinking is not a social ritual in Antimari—in Antimari people drink to become drunk. Certain local people have reputations for violence while drinking and are left alone when intoxicated. One Antimari resident who came from Rio Branco was frequently jailed in that city for violence associated with alcohol use. He was bailed out of jail so many times by his cousin from Antimari that he took up residence at a local colocação and now does not leave the forest. Alcohol abuse is a factor in most incidents of social discord, usually domestic fights.

Both the Assembly of God and the Catholic Church condemn the use of alcohol and most women, at least publicly, disapprove of its use and do not permit it in houses. Thus, men resort to caching bottles in hollow trees and other hiding places around their colocações. Bottles of alcohol are also frequently passed among participants in work parties or when men are traveling both on foot and in canoes out of sight of women.

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[3] Isopropyl alcohol, C_3H_8O, is similar to the ethyl alcohol found in liquor. Its effects on the human system are also similar and do not include retinal injury.

Tobacco use is also condemned by local Pentecostals. However, many Catholic families grow and cure good quality fine tobacco for their own use. The tobacco is made into cigarettes, never cigars or used in pipes. Neither is it ever chewed nor made into snuff. Men smoke in the presence of women both in dwellings and outside. Women openly smoke inside dwellings but not in public.

Few drugs other than alcohol and nicotine are used in Antimari. Marihuana was grown by one family for a short time but they became disinterested and stopped. Ayahuasca, an hallucinogenic derivative of a locally found bush (*Psychotria viridis*) and a common vine (*Banistereopsis caapi*), was produced and consumed on an experimental basis for a short time but its use was also discontinued after condemnation by local women and Pentecostals.

Recreation and Leisure

Recreation and leisure activities are separate from some productive tasks but are sometimes productive tasks themselves. For example, tapping rubber or weeding a horticultural plot is never done for recreational purposes but men hunt as a recreational activity and some women make brooms and baskets as a leisure pastime as well as to produce domestic utensils. This is not to say that men do not hunt and fish at other times out of the need to provide protein for their families. But there is a difference in seriousness between a casual evening stroll down a forest path with gun in hand in hopes of encountering game and lying in wait all night close to a bush that is potential game forage in hopes of shooting the next day's meal. Likewise, adults and children of both sexes regard fishing as recreational and categorize time spent angling as leisure time. However, while a family spending a leisurely hour before dusk fishing together on the river bank with hooks and lines is considered recreational, men working all night setting trot lines, nets, or fish traps consider their task serious food-producing labor.

Purely leisure pastimes include playing dominos and listening to a radio if one is available. Pentecostal families spend some time in the evening listening to the Bible being read if one is available and there is a literate person present but people generally do not read for recreation because most are illiterate and because there is little reading material available in Antimari. Similarly, daytime recreation for young people is limited. There are no toys or sporting equipment in Antimari with the exception of one soccer ball that is used in games at Colocação Boa Vista. But social events sometimes occur in the evening at the trading posts which are the only places large enough to shelter more than one or two families under a single roof. Only neighboring families attend because others live too far away. Young people dance to radio music and women sit and talk to each other while acting as chaperones. Dancing is strictly a courtship event. Couples who are already married or cohabitating do not dance and people do not dance alone or with members of the same sex with the exception of some adolescent girls who dance with each other when no desirable or willing boys are present. Older and married men do not frequent the dancing and socializing area but confine themselves to standing under neighboring trees or squatting in groups on the ground just out of the light of the main area. There they talk with each other, discuss local events, smoke tobacco and drink alcohol.

Religion

Catholicism. Catholics have three *comunidades de base*, or base communities, in Antimari but no priest or other Church official to lead them except a lay reader called a *monitor*. Neither is there a Catholic church or shrine in the entire area. However, some local Catholics meet every 15 days to have the Bible read to them by the monitor. In addition, an itinerant Italian priest visits Antimari twice each year to baptize and marry the population. As stated previously, residents are not usually motivated toward being formally married but are extremely interested in having their children baptized because they believe that their children will not enter heaven if they die without the benefit of this consecration. The priest persuades couples to marry by refusing to baptize their children until the parents are wed.

Days important to the Roman Catholic religion are recognized and sometimes celebrated by local Catholics. Christmas, Easter, and the days of St. George, St. John, St. Anthony, St. Peter, and St. Michael are all acknowledged by some families who gather at Colocação Volta da Onça where they are led in prayers by the monitor. Aside from these events, little prayer is publicly displayed. Grace is not said before meals and there are no audible night-time prayers by children in preparation for sleep. However, some Catholic families practice a moment of silent prayer and reflection at dusk every day.

Assembly of God. In addition to the more traditional Catholic presence in Antimari, since 1989 there has been a growing Pentecostal moment sponsored by the Assembly of God Church of Rio Branco which supports intensive evangelism in rural Acre. Calling themselves *crentes* or believers, local Pentecostals refrain from the use of tobacco, alcohol, dominos, playing cards, gambling, and cohabitation out of wedlock. They also condemn dancing and listening to non-religious music. There is a wooden-board Assembly of God meeting house at the upstream end of the Antimari area at Colocação Gorgolejo. However, like the Catholics, Antimari's Pentecostals also lack a sanctioned religious leader such as a minister. A local literate man volunteered to act as a lay representative, called an *obreiro* (worker), to evangelize in the area. The target of the obreiro's evangelism in Antimari is the heads of households who will then lead their families into the Church. The obreiro holds meetings, called *cultos*, where he is authorized to baptize new members. To become a member one must confess one's faith, turn from sinful ways, become baptized, and pledge ten percent of one's wealth, earnings or produce to the church. Some teens in families converted from Catholicism rebel and do not follow the family into the stricter lifestyle of the Pentecostals. They are not forced to participate in Pentecostal ceremonies or rituals but they are forced to go outside of the family dwelling to listen to secular music, smoke, or drink alcohol.

The Church in Rio Branco occasionally gives some industrialized foodstuffs and used clothing to Antimari's Pentecostals and has an outreach program of activities throughout the year. Pentecostals who are residents of Antimari are kept informed via radio announcements and invited to go to the city to attend functions such as men's, women's and youth meetings and various religious celebrations. If they travel to the city to attend these events, Antimari residents are sheltered in Pentecostals' homes in Rio Branco and thus make and reinforce social networks with people outside of Antimari, an opportunity not as available to their Catholic neighbors.

Folk Science and the Preternatural

In addition to and sometimes in conjunction with their Christian religion, the people of Antimari possess a body of secular beliefs about the world around them and how it functions. These folk beliefs are held to varying degrees in Antimari just as folk beliefs are in Western, technological cultures. For example, many North Americans would deny a belief in receiving bad luck by walking under a ladder but would still be hesitant to do so. Likewise, adherence to some beliefs is not publicly acknowledged in Antimari despite private feelings and actions to the contrary. For instance, just as many people in Western cultures know of the notion that breaking a mirror will bring seven years of bad luck but few believe the concept as real, there still exist folk beliefs in Antimari that local residents are aware of but do not necessarily believe in. Neither is the extent of belief uniform but varies from individual to individual and perhaps according to age and level of education. Finally, except for sightings of flying disks in the sky and hearing the screams of the *gritador* (screamer) in the forest at night, the supernatural occurrences that were related to me in Antimari were not first-hand accounts but were reports of the experiences of others or explanations of generally held knowledge. Informants did not usually claim that they themselves had encountered supernatural forest creatures but related accounts of encounters of their grandfathers or some other person distant in time or space. At times informants who were eager to relate their knowledge of the supernatural refrained from including themselves among local believers but instead related that, "*os velhos dizem*," or "*eles dizem*" ("old people say" or "they say "). This is neither a new nor isolated phenomena as Harris (1956), Smith (1996), and Wagley (1976) encountered similar responses during interviews regarding the supernatural in Brazil.

Folk knowledge can be divided between prescientific beliefs about actions and reactions in the real world and beliefs regarding the supernormal such as spirits, demons, and magic. Prescientific beliefs include dietary taboos, explanations of natural phenomena and curative and preventive folk medicine not related to the supernatural (Harris 1956:242). For example, in Antimari the belief that all land snakes are venomous is obviously beneficial by protecting believers against dangerous snake bites. Other beliefs are more explanatory in nature. I was having dinner with a family with whom I was staying at a remote colocação when an earthquake started to shake the lashed-pole and thatch hut that was their home. As it was late evening, the inside of the hut was illuminated only by a small kerosene lamp and the embers of the cook fire. After getting the children out of the hut, the immediate concern was that the fire or the lamp would raze the hut and all their worldly possessions. But, by the time the household head and I dashed back into the hut to secure the fires, the quake had ended. We then pushed the hut back to an upright position and began to talk about what had happened. It was then that I learned that local people believe that earthquakes occur because the Earth is a disk set on a point in its center and there have been so many new buildings built in the city of Rio Branco that the Earth is tilting because of the extra weight on that side.

Local folk science also applies to the realm of treating diseases regardless of their perceived origin. However, folk remedies are considered pharmacologically efficacious and no magical powers are attributed to them. In like manner, no incantations, spells, amulets, charms or other fetishes are employed to prevent or combat disease or other misfortune. There is no folk medicine specialist in Antimari except for one elderly man, Sr. Rodrigo, who is considered a *rezador*, a healer who uses a combination of prayer and waving plants or boughs over patients to treat illnesses. He is either requested or he merely arrives unsummoned after learning of an illness or injury. He must be present with the patient to cure but no physical manipulation of the patient takes place. His prayers are said in a very low voice so that others nearby cannot understand them. When interviewed, he reported that his cures are based on the power of Nature (*a natureza*) and of Jesus but that a successful treatment does not require the knowledge, belief, or permission of the patient. The reazador's unique specialty affords him little additional social status and is not used as a political or social force. Neither is he feared to have the ability to perform sorcery. His treatments are always considered weaker than, and supplemental to, the application of industrialized medicine for most maladies. He is not compensated for his services.

In addition to prescientific notions about how the world works, other aspects of dealing with the environment do involve magic as an explanation for certain phenomena, especially regarding hunting and fishing. For example, it is felt that it is difficult to hunt tapir because when pursued they always go to water and transform themselves into large black snakes that remain secluded under the surface. Additionally, magical powers of intelligence are attributed to pacas (*Agouti paca*) because of their tendency to chew through the trip-strings of armadilhas and other animal traps causing them to fail to fire. It is a fact that, in an effort to obtain residual salts, pacas frequently chew on trip-strings, tool handles and anything else humans have handled. But it is also thought that pacas never die when old but merely transform into large water snakes.

There is magic associated with human pregnancy such as some pregnant women having the ability to kill snakes by staring at them. But pregnant women and the children growing inside them are also thought to be especially susceptible to magic. Women do not let another person stand behind them lest that person impart some evil on the fetus. Neither will they look at or go near a pig or a monkey for fear that their child will be born with the appearance or characteristics of those animals.

Sorcery and possession are not part of the corpus of folk beliefs in Antimari but people avoid cemeteries out of a nonspecific fear of the ghosts of the dead. In addition, there is some fear of malignant creatures that await unwary residents who travel through the forest. One of the best known of these is the Mapinguari. The creature is so much a part of local lore that a section of forest along the edge of the Antimari river bears its name. The area named Mapinguari is said to have been the focus of mapinguari activity and sightings in the past. A local informant described a mapinguari as two meters high with a chest that opens like double swinging doors to reveal a cavity in the body. There is a single large eye like that of a caiman in the middle of the forehead. He believes they reproduce by laying eggs but his wife believes that mapinguari are unbaptized Indians who have grown old. They are covered with long hair and have an offensive, strong odor that makes people insensible. They also have claws like those of a hawk or eagle. Informants claim to have recently seen mapinguari tracks in the area of Antimari but no one claims a current sighting. Long-time residents claim that 1967 was the last year that any mapinguari were killed, a large one and a small (young?) one. Others had been shot in the past. One is said to have been cornered in a stand of bamboo by local hunters' dogs.

Another forest creature that can emit an evil odor, or *catinga*, that can put people to sleep is the *curupira*. A forest demon of Tupi Indian origin, the curupira is a small man who uses shrill cries to lure over-zealous hunters ever deeper into the forest until they are lost, thus protecting animals from being over-hunted. His ability to deceive people into going deeper into the forest is aided by the fact that his feet point backwards so that his tracks give the impression that he is traveling one way when he is really luring his victim in the opposite direction. No one claims to have ever seen a curupira in Antimari but many informants who travel the forest assured me of his existence.

Mapinguari, and curupira are preternatural creatures seldom or never seen by local residents. However, a creature believed to possess supernatural power that is encountered frequently by the people of Antimari is the pink freshwater dolphin (*Inia geoffrensis*) found in the Rio Antimari. Residents, especially women, avoid the water and the river bank if a dolphin is seen. They are afraid of the mischief that dolphins can inflict, especially the enchantment , seduction, and rape of local girls. No one in Antimari has claimed to have been seduced by a dolphin but all acknowledge the possibility. When a dolphin came near the river bank the people, especially the women, would not go near the water and refused to bathe on the river bank that evening and men related that they feared the creature would capsize their canoes.

Another tangible but still unseen creature makes its presence known by screaming in the forest just out of sight of people's dwellings. Called a *gritador*, or screamer, no one reports knowing anything about the creature or its habits. One afternoon, I was talking with a family while visiting their colocação that abutted the river when our conversation was interrupted by human-like screams that seemed to originate a mere 60 meters into the nearby forest. The family's two dogs quickly alerted to the sound and bounded toward it with hackles raised and furious barking. The male household head and one of his sons quickly retrieved shotguns from the dwelling and the three of us followed in the direction the dogs had taken. Neither we nor the dogs found anything or anyone. As my visit was not planned, what had transpired could not have been perpetrated for my benefit nor do I think that a neighbor would risk being shot or attacked by dogs in order to play a joke on a colocação that required an hour to reach. The family whom I was visiting called the intruder a gritador and were somewhat agitated about its presence although no guard other than the dogs was posted that night as we slept.

The forest and river creatures discussed above, with the possible exception of the gritador, are not uncommon elements of rubber tapper folklore and can be encountered in many places throughout the Amazon. However, I quite unexpectedly encountered another preternatural occurrence in Antimari that is little-mentioned in traditional Amazonian bestiaries. While admiring the clear sky after an evening meal at Colocação Jabuti situated near the river, one of the residents related to me that the direction in which I was looking was where the family had seen a *disco voador*, or flying saucer, in the sky in 1992. I asked him what it was and he replied that he did not know but that it was the size of a soccer ball and had a light on it which shifted from blue to yellow as it flew slowly at a height of about ten meters over the tree tops until it was out of their field of view. Other members of the family agreed that they had seen the object but did not appear overly interested in the topic and did not ask my opinion of it. I was not sure if a joke was being played on me—perhaps a kind of jovial revenge for my incessantly asking them questions about life in the forest—so I did not pursue the matter any further at that time. However, I managed to ask other families about seeing things in the sky and was told the same account by the family of a nearby colocação. They too related having seen a flying disk in 1992 and described the same colored lights. The two families knew each other, as everyone knows almost everyone else in Antimari, so it remains unknown whether there was any duplicity. However, as I have not omitted accounts of other unusual things on the grounds of suspected deception, I feel that not relating descriptions of a flying disk would be less than objective.

Ideology

Ideological elements of a culture provide a feedback mechanism that regulates resource use, social relations, and patterns of production and distribution (Johnson and Earle 1987:95). They are based on and reflect a society's economic base and mode of production. As Antimari's economics are based on traditional extraction, so is local ideology. However, as Antimari's economy changes away from traditional extractivism, so does its ideology. There are no powerful institutions, influential leaders, or other conservators of cultural norms to counteract outside influences despite the fact that external influences are limited to radio broadcasts and rarely occurring trips out of the forest. But Antimari society is not distinct from the dominant Brazilian culture in language, custom, history, religion, or values. In the quiet of Antimari's rainforest one can hear faint whispers of air liners flying 30,000 feet overhead. Moreover, local peoples' worldview includes at least vague notions of exotic things such as the Europe, whales, and x-ray machines. Furthermore, although a sameness of culture and ideology exists throughout the Antimari area with the only variation manifesting in residents' allegiance to one of two denominations of the Christian religion, there is little sense of community or group identity, no Gemeinschaft-like "we-ness" (see Tönnies 1950). In Antimari , there are no religious brotherhoods, no clubs, nor orders, and no political party affiliations. Consequently ideological change will have little to overcome when changes in the material base and mode of production occur. For example, and perhaps as a harbinger of future change in the culture as a whole, traditional values and ideologies change dramatically in Antimari's adolescents when they migrate from home to the city. The formerly rural teens adapt readily to an urban lifestyle and spurn the more traditional, more conservative values of their parents. Some stop attending school, start staying out late at night, and demand more and more expensive material goods such as stylish clothes and personal electronics. Others become promiscuous and leave jobs as domestics in order to have more time for socializing. A common complaint is that they no longer want to help the family and no longer show as much respect for adults as they did while living in the Antimari.

Historical Socioeconomic Organization of Extraction

The aviamento system has not been emphasized in current literature on the Amazon because it does not flourish along colonization highways where small-scale farming with dependence on merchants or cattle ranching is more prevalent (Romanoff 1992:123). Weinstein notes that the more authoritarian forms of the pre-1920 patrão system existed in the Western Amazon where people are more isolated (Weinstein 1983:20,27). Although not as rigid, the historical socioeconomic structure of the Antimari area followed the general structure and organization of production that could be found on most rubber estates of the Acre region.

The seringais (rubber estates) that had constituted the area around the Antimari river until the mid-1960s were Seringal Arapixí (center, left bank), Seringal Limoeiro (center, right bank), Seringal Mapinguari (center, left bank), and Seringal Pacatúba (upper, left bank). Rubber estate owners, or patrões, centralized the tappers' production, commercialized the product, provided industrialized goods and other supplies on credit, and lived in the local area on specific colocações that served as their headquarters, trading posts, and gathering places for area residents. Overseers, called *gerentes*, supervised the estates on behalf of the owners. They were either paid a salary or extended credit as payment. If paid in credit, they generally received a percentage of the profits from the sale of imported supplies and from exporting Brazil nuts and rubber. In Antimari, as the gerentes were both literate and numerate, they also fulfilled the position of *guarda livro*, or bookkeeper, who recorded transactions between tappers and the seringal's trading post. Mule drivers and boatmen transported extracted products and industrialized supplies for each trading post. Both were called *comboeiros* and both were salaried via credit extended to them at their employer's trading post. Traditionally, there were additional salaried workers who did not tap rubber but who were employed by each rubber estate owner. They usually worked in the following roles:

- Men called *mateiros* were hired to locate rubber trees in the forest in order to open new rubber trails. They were either salaried or paid according to the number of trees they located.

- *Toqueiros* were tasked with cutting trails connecting the rubber trees located by the mateiros. They were paid according to the number of trees connected by trails.

- Day laborers, or *diaristas*, worked for the seringal performing general maintenance and non-extractive labor such as tending agricultural plots and livestock, making *farinha* (manioc flour) or maintaining mule trails and their bridges as directed by the overseers

- Blacksmiths made and repaired tools such as machetes, agricultural implements, rubber tapping knives and firearms. Called *ferreiros*, they were autonomous and itinerant as no single seringal had enough work to employ a full-time smith. Smiths maintained credit accounts at the barrações and were thus tied to the area by debt just as were rubber tappers (Paula 1980:26).

The estates of the Antimari area were as not rigidly ordered as others and the owners did not invest much in their oversight. Consequently, many of the above-delineated roles were filled by the individual rubber tappers. It was they who found rubber trees in the forest and connected them by trails and it was the members of the gerentes' family who performed general maintenance and non-extractive labor at the trading posts and on major forest trails.

Another important factor, albeit outside of the socioeconomic hierarchy of the rubber estate, consisted of itinerant traders, called *marreteiros*. As independent operators, they plied the river along rubber tapping areas in small boats. In direct competition with the trading posts of the patrões, they extended credit to rubber tappers, sold them food, supplies and other industrialized goods in exchange for rubber, Brazil nuts and occasionally other forest products. Rubber tappers were usually prohibited from dealing with marreteiros because the rubber they traded was considered property of the patrão for whom they worked. It was these itinerant river traders who became increasingly important as sources of trade and transportation after the breakdown of the traditional aviamento system in Antimari.

Antimari's patrões had a history which was integrated with that of the local residents for all of them were themselves ex-tappers. For this reason they remain respected within the community. Relations between patrão and extractivist family are different than between merchant and customer. While merchant-customer relations are generally singular transactions involving money exchanged for goods with each transaction being isolated and having nothing to do with previous or future transactions or other relationships between the two parties, the patrão-extractivist relationships and transactions have time-depth and include more than purely economic transactions.

Extraction formed a complex structure of social and economic relations which sustained a network linking commercial establishments such as the large export houses to aviadores, patrões, marreteiros, and eventually individual seringueiro households. These relations of production articulated the rubber tapper, the patrão, the urban trading house, and the exporter as participating agents in a process which functioned via the immediate and visible domination of mercantile capital.

Current Socioeconomic Organization of Antimari

In Antimari, there remains a socioeconomic and geographic grouping of households that roughly adheres to the former rubber estates that constituted the region's infrastructure and sociopolitical arrangement when the area had been dominated by patrões. This orientation can be observed by noting which of Antimari's 91 colocações remain occupied, where families gather socially, and where they go for trade. The three major foci of socioeconomic orientation are the colocações, Laranjal, Mapinguari, and Limoeiro located along the river. The Laranjal area occupies what was Seringal Pacatuba while modern Mapinguari and Limoeiro reflect the former seringais that bore the same names. In addition, there remain two groups of inhabited colocações situated away from the river in Antimari's interior. One of groups lies to the north of and is socially and economically oriented toward Laranjal and the other interior group is located north of Limoeiro and has social and economic ties accordingly (see Figure 5.1). The group that lies north of Limoeiro consists of colocações that formerly comprised Seringal Arapixí.

But the previous socioeconomic stratification of the old rubber tapping system no longer exists in Antimari. The area's former patrões no longer claim ownership of the area's bygone rubber estates nor do they live any longer in Antimari but have moved to the city of Rio Branco and abandoned claims to all but the colocacões that used to be their headquarters and trading posts. Two of the former patrões still buy locally extracted rubber and Brazil nuts and extend a very limited amount of credit to local families. But trade relations are increasingly limited to single events of buying or selling and the trading posts maintained at Mapinguari and Limoerio stock a diminishing amount and variety of staples and basic industrialized necessities. The former patrões' main interest is now limited to being repaid for credit extended to local residents in the past. They still visit their abandoned seringais and buy some extracted goods.

Currently, the socioeconomic matrix consists of individual, independent, forest-dwelling households which maintain economic relations with the remnants of the former trading posts that were operated by Antimari's patrões. In addition, the occasional itinerant river trader plies the area and serves to mediate economic relations between households and trading posts to some degree by providing an alternate buying and selling point. When local residents have no credit or have large debts and need money or more supplies, they resort to the marreteiro. Thus, the structure of Antimari in 1994 did not represent a stable, socioeconomic organization. Instead, it was a constellation of households whose geographic and social formation was arranged, not by plan, but as a devolution from the area's former configuration and was moving toward further degradation.

Socioeconomic Mobility

When all goes relatively well there is some security for Antimari's extractivist families. Their surroundings are secure, quiet and tranquil. Most households have some surplus of manioc flour and maize stored and most have chickens or even a pig to eat in times of bad hunting. Almost all would prefer to concentrate on their livestock and crops and dream of raising cattle. But there is never an accumulation of resources or money. So there is little chance for extractivists to rise to a position where they employ other laborers or buy extracted products and provide provisions to others on credit. This kind of socioeconomic upward mobility has occurred in only one case in Antimari and that was done more through intimidation, exploitation and coercion than through hard work and savings.

Leadership, Community Representation, and Meetings

Leadership. Cross-culturally there are several socioeconomic problems that encourage the rise of leadership in non-market or minimally market-oriented societies. These include risk management concerning food supply where it is unpredictable or scarce, management of communal technology, organization and representation of groups in warfare, keeping accounts and negotiating trade deals, and group representation when dealing with outside entities such as the state (see Johnson 1989). However, as Antimari has not yet experienced the above problems, leaders have not emerged to manage them. For example, food is so consistently available in Antimari that it is common to hear residents end descriptions of the problems and hardships of living in the area by commenting that, in contrast to life in the city, in Antimari at least they always have something to eat. So adequate food supply has never been problematic enough nor pervasive enough to prompt the emergence of local leaders. In addition, although the river and unclaimed areas of forest are considered common property in Antimari, communal technology does not exist so leaders are not needed for its management.

Like communal technology, warfare is completely absent from Antimari so leaders are not fostered by the needs of battle and peacemaking. Moreover, as the population is extremely dispersed and there is little competition over resources, interpersonal disputes are relatively rare and usually not violent. There are some respected local individuals whose opinions are routinely sought regarding disputes but they carry no authority and have no power to settle conflicts.

If the dominant relations of production are antagonistic and involve divisions of labor other than by age and gender, or when there exist a class of non-laborers, then the society will entail positions of representation or administration. Otherwise, there is no need for this level of political organization (Hindess and Hirst 1975:13). The people of Antimari sell extracted goods on an individual basis. Residents are not in competition with one another to meet a small market demand. But, as economic transactions involve individual familys' credit accounts and different arrangements are made for various families, there exists no stimulus for leaders to emerge to conduct representative negotiation for the sale of the area's seasonal production of extracted goods.

Community representation and meetings. Antimari's extractivist lifestyle necessitates a highly dispersed population which makes difficult collective action and feelings of unity. In the past, FUNTAC has attempted to organize community meetings but the wide geographic dispersal of the local population hinders travel to such events. Attendance by male family representatives usually means the loss of an entire day of labor while attendance by female family members usually entails their being accompanied at least by nursing children. They relate that the hardship of carrying children through the forest to meeting sites and providing food and other care for them including finding a place to sleep overnight, outweighs perceived benefits of attending community meetings—an activity that is viewed more as a courtesy to the outsiders who organized the meeting than as a vehicle for bettering their lives. Moreover, in Antimari, nuclear families are not permanently tied to stable multifamily groups. This level of production unit makes sense but provides no economic basis for cooperation. It had also been difficult to organize a residents' association in Antimari because the residents are not accustomed to attending meetings and consequently tend not to participate in the proceedings and are reluctant to speak their minds. In addition, as the economy is based on trade and not in cash, residents are not able to pay money for association dues. Finally, some feel that only one residents' association encompassing the entire area would not be representative as the interests of the riverine families are different from those of the interior and there is rivalry among the areas over the potential future allocation of infrastructure such as schools and health posts.

Antimari's socioeconomic history, its family-level society and consequent lack of community organization and representation, and its cultural traits in general, are not arbitrary. They are reflections of, and adaptations to, the physical and economic environment in which local families have lived for generations. More importantly, as will be shown in the following chapters, these cultural characteristics also provide a contextual background and base that influences how, and to what degree, individual households modify their lifeways in response to new economic challenges.

CHAPTER 6
HEALTH AND NUTRITION

Any study that relates to the welfare of a population requires consideration of its health, nutrition, and sanitation as these topics relate to the biological component of overall well-being. Health status is an important indicator of overall quality of life for a group or for a lifeway because, if basic biological needs are not being met, then the lifeway is maladaptive and will not reproduce for long. Therefore, it is important to gather information on general health and hygiene both as a measure of adaptive well-being and as a baseline for future study.

As a group, the residents of Antimari are in good health, a fact that was often commented upon by local residents in interviews. Morbidity and mortality rates and causes are about the same in Antimari as in other rural areas of the state (Lazarotti 1990). Sporadic fevers caused by malaria and arboviruses are the most frequent complaints while colds and other upper respiratory inflammations and infections are the second most frequently reported ailment. Respiratory problems along with diarrhea constitute the main health problems for children 0 - 5 years of age. Other commonly found illnesses include, intestinal worms, gastritis due to alcohol ingestion, mucocutaneous leishmaniasis, and skin infections caused by lice, scabies, and staphylococcus.

Historical Perspective on Local Health

The earliest information concerning human health in the Acre region relates that smallpox entered the mostly indigenous population in the beginning of the 17th century (Reis 1953:132). Later, when rubber tapping dominated the region, the Brazilian workers experienced a chronic lack of greens and fresh food, especially fresh meat, because no one wanted to take time away from tapping rubber to cultivate food crops. This caused epidemics of beri-beri which, combined with malaria and intestinal infections, was responsible for the majority of deaths in Acre (Tocantins 1961:137). Today, deficiency diseases are rare although malaria and internal parasites are still major problems.

Current Health Issues

Incidence of Specific Diseases

Malaria. While accompanying a government survey of the Acre region in 1905, a physician reported that not one specimen of malaria-carrying mosquito (*Anopheles spp.*) was found in the area. Furthermore, although he reported numerous cases of typhoid and paratyphoid, he found no cases of malaria-induced cachexia (Catunda 1905). In contrast, just nine years later malaria had become so prevalent in Acre that an advocacy group for the rubber industry claimed that, "In 1909, it could be said that, except for residents of [the city of] Rio Branco, all of the Acre region's human population was infected with malaria" (Commissão Mixta de Defesa da Borracha 1914:5). While it may be prudent to remain skeptical of the scope of the claimed pandemic, its dramatic disparity with the account of 1905 suggests that malaria had swept into the Acre between 1905 and 1909 along with the westward expansion of rubber tapping. Nevertheless, longtime residents of Antimari claim that even in the late 1960s and early 1970s, there was no malaria in the Antimari river basin, perhaps because of its remote location (Lima 1994). A 1989 FUNTAC study reported that malaria was endemic to the entire Antimari area but being kept under control at the time by the Superintendência do Combate da Malária (Superintendency for the Combat of Malaria) (SUCAM) and that reports of actual cases were only anecdotal (FUNTAC 1990b:46). From the early 1970s to the early 1990s SUCAM had a permanent presence in the Antimari area spraying the insecticide dichlorodiphenyltricloroethane (DDT) and treating malaria cases. However, by 1993 SUCAM workers entered the area approximately only once every six months. In addition, SUCAM workers were no longer visiting every rural dwellings but concentrated only on easily accessed riverbank colocações. By 1992, malaria was much worse in Antimari than in many other parts of Acre due to lack of support from that government health organization. By 1993, entire families in the lower Antimari area contracted malaria caused by *Plasmodium falciparum* while the upper Antimari area from Mapinguari upstream to the bridge at BR-364 was heavily infected with malaria caused by *Plasmodium vivax.* The treatment records at the health post at Mapinguari document that during each month of 1993 at least 23 percent of the population was being treated for malaria or was awaiting the results of a blood test in order to begin treatment.

By 1994, SUCAM workers were visiting only dwellings along the riverbank and spraying a non-DDT based insecticide upon arrival regardless of time of day. This was ineffective because, unless spraying was performed at dusk, night or dawn, the malaria carrying mosquitoes were not directly sprayed and the insecticide had no residual ability.

When in the area, SUCAM workers can examine malaria victims and draw the blood samples needed to identify the type of malaria involved. Ascertaining the type of malaria contracted is an essential first step in the treatment process because the two types of malaria endemic to Antimari require different combinations of drugs for treatment. However, SUCAM personnel cannot analyze the blood samples in the field and must take them to Rio Branco for laboratory analysis and then pass the results to a health post worker in Antimari via public radio broadcast—a process that frequently takes up to one month to complete. Once the strain of malaria has been determined and the test results received, the health post worker can administer the proper combinations of primaquine phosphate, chloroquine, quinine sulfate, and pyrimethamine-sulfadoxine to combat the disease.

Hansen's Disease (Leprosy). Hansen's disease occurs in Antimari with production activities and nutritional status appearing to be a critical factor in who contracts the disease. There may also be a connection between incidence of leprosy and the killing and eating of nine-banded armadillos (*Dasypus novemcinctus*) as they are the only known non-primate reservoir for the parasite *Mycobatcerium leprae* which causes the disease (Berkow 1992:147). Secondary infections in the limbs and extremities of victims are common due to neuropathic anesthesia. As most victims are adult males who spend great amounts of time in the forest, feet damaged by obstacles while walking on rubber trails and hands and fingers cut by machete mishaps are common among Antimari's leprosy victims. Treatment requires the victim to relocate to the city of Rio Branco where extensive chemotherapy, consultation, and management training is available. However, most of the victims are the main production resource for their families and are thus reluctant to abandon them to relocate to the city to undergo what they consider a selfish and costly treatment regime. Only one infected man left his family in Antimari to undergo treatment in Rio Branco, but he returned after a few months citing concerns about cost and the welfare of his family as his primary motives for discontinuing treatment. By 1994 he was still tapping rubber and supporting his family but had lost feeling in both feet and was unable to fully open his hands. He reported that he did not intend to seek further treatment.

Leishmaniasis. Leishmaniasis, an infection caused by the protozoa (*Leishmania sp.*) and transmitted by sandflies (*Lutzomyia flaviscutellata*) indigenous to the Antimari river area, occurs with some frequency in Antimari. The only cure is the ingestion of sodium antimony gluconate but this drug is not locally available. Consequently, residents resort to the traditional treatment of having a dog lick the ulcers or of swabbing lime juice or saliva on them every morning. Some spontaneous remission of lesions is attributed to the above methods causing local people to cite instances of miraculous cures.

Viruses. Viruses with influenza-like symptoms were the second most frequently reported disease in FUNTAC's 1989 socioeconomic study (FUNTAC 1990b:46).

Arboviruses of unknown etiology are frequently contracted in the area and usually result in fever and incapacitation for a few days and then eventual recovery.

Gastro-Intestinal Maladies. Gastritis, along with stomach ulcers, usually occurs in Antimari as a result of the habitual consumption of isopropyl alcohol among men. For treatment, a supply of aluminum hydroxide is stocked at the main health post at Mapinguari. Intestinal parasites, including nematodes, are not a large problem in Antimari but are reported. Heavy worm loads in conjunction with malaria sometimes make children anemic and susceptible to other opportunistic diseases especially upper respiratory infections. When nematodes infest at load levels warranting attention, local people treat them with traditional remedies such as having the victim ingest an infusion made from tree bark, swallow an amount of tobacco equivalent to one cigarette, or drink a spoonful of kerosene, all of which are usually efficacious. The anthelmintic, Mebendazole, is also available at the health posts.

Snakebites. Snakebite, or *ferrada de inseto* occurs infrequently in Antimari.[1] As no antivenin is available, treatment for snakebite is limited to the administration of penicillin or other antibiotics. Although these drugs have no ability to combat envenomation, an antibiotic regime is supportive due to the wide variety of both aerobic and anaerobic bacteria in snakes' mouths (Cox 1991). Moreover, as very few bites, even from venomous snakes actually inject venom, any treatment that does not harm the victim will appear efficacious.[2]

Other Medical Problems. Other diseases found in the area's population include asthma, cataracts, conjunctivitis, hernia, and infected and abscessed skin breaks. In addition to these maladies, fungal infestations and work-related accidents are commonly experienced by men. Tetanus was common before vaccination but the area is free of Chagas' disease (American trypanosomiasis).

Traditional Medicine

In Antimari, there is no ideological conflict between traditional and scientific systems of healing and local people use modern medicine whenever they can get it. Traditional medicine is thought of as what people resort to when scientific medicine is not available or does not produce cures, except in the case of the previously mentioned resident folk healer whose services are often employed as an adjunct to scientific treatments for illness. The availability of sulfa drugs and other antibiotics through the FUNTAC-sponsored health posts has led residents to opt for these modern treatments. For obvious injury, malaria, and problems with pregnancy, people turn to scientific medicine as represented by the health post and rely more on folk medicine for chronic minor health problems and for veterinary needs. However, despite the decline in use of remedies derived from local plants and animals, there remains an extensive pharmacopoeia of traditional medicine known to local residents as depicted in Table 6.1. One medicinal plant that is considered solely the domain of men in Antimari is a mixture of plant extracts taken to make one proof against the effects of snake envenomation. Known locally as *curado de cobra*, or snake cure, the extract is said to offer limited immunity and must be reinforced every two years. Most families maintain a *jirau*, a small elevated garden made of old planks or an irreparable canoe filled with earth in which herbs and condiments are grown. However, no preparations are made in advance and stocked except for the ubiquitous custom of drying orange rinds over stoves for use in curing upset stomachs.

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[1] Local residents believe all land snakes are venomous. In Antimari, snake bite is called *ferrada de inseto* (insect wound) because all objectionable animals, including rats, snakes, arthropods and bats are called *inseto*, meaning vermin.

[2] World-wide statistics regarding snake bite reveal that 40 percent of the time people are bitten by poisonous snakes, no venom passes into the victim and 85 percent of the time only enough venom passes to make the victim sick (Cox 1991).

Midwifery. There are two women in the area who are regarded as midwives. They have no training outside of Antimari and coordinate little with the health post workers who hold mixed feelings about the midwives' abilities. However, as providing health care in general is thought of as a burden by two of the three health post workers, they consider the midwives important to the health of the community if only to relieve the health posts of some of the responsibility of dealing with pregnancy which is viewed as a health care need that is difficult to address, has a high potential for a negative outcome, and carries a tremendous responsibility for the health care worker in the event of mishap. Health post workers are knowledgeable only in rudimentary prenatal examination and delivery of well babies.

Table 6.1. Medicinal Plants of Antimari and their Uses.

Common Name	Scientific Name	Part Used	Indication	Preparation
Aninga do Igapó	*Montrichardia arborescens*	Entire plant	Poison, Seeds	Infusions, seeds used for fishing bait.
Cajuí	*Anacardium spp.*	Bark	Heartburn, Topical disinfectant	Drink infusion, Apply infusion topically.
Cipó Ambé	*Philodendron spp.*	Stalk	Analgesic	Apply sap to wound.
Cipó Cravo	*Tynanthus elegans*	Leaf, Root Covering	Stimulant, diuretic, Aphrodisiac	Make infusion from dry leaves or roots.
Cipó Estralador	*Leucocalantha armatica*	Leaf	Cold, Fever	Drink infusion with sugar.
Cipó de Fogo	*Davilla latifolia, Davilla lucida*	Leaf, Stem	Venerial disorders	Boil in water, stir, use as douche.
Cipó Salsa	*Unknown*	Leaf, Stem, Root	Skin diseases, Thin blood	Boil vine with root and leaves, place in the sun for 15 days then drink.
Coentro Bravo	*Coriandrum sativum*	Leaf, Stem	Stimulant, Aphrodisiac	Infusion from steeped leaves.
Copaíba	*Copaifera multijuga*	Oil	Topical antibiotic	Extract oil, apply topically or drink infusion
Corama	*Unknown*	Leaf, Stem	Diureteic, Bronchitis	Crush to remove sap to make syrup.
Cumaru Amarelo	*Dipteryx punctata*	Seeds, Bark	Bronchitis, Pneumonia	Infusion mixed with copaíba & Jatobá.
Gameleira	*Ficus spp.*	Latex	Digestive disorders	Mix with water and drink as purgative.
Jatobá	*Hymenaea courbaril*	Bark	Cold, Flu	Boil bark and mix with egg yoke & sugar
Lacre	*Vismia guianensis*	Latex	Skin diseases	Apply raw latex.
Muruci Rasteiro	*Verbascifolia*		Intestinal ache	Crush leaves and roots
Mutaleiro	*Unknown*	Bark	Skin diseases	Drink infusion.
Orange	*Citrus auratium*	Rind	Stomach ache	Infusion from dried rind.
Orelha de Veado	*Byrsonima*	Leaf, Root	Acid stomach,	Drink infusion.
Pau Gemada	*Unknown*	Root	Stimulant	Grate root into pudding.
Quebra Pedra	*Phylanthus nirui*	Entire Plant	Diuretic, Kidney stones, Bladder infection	Drink infusion.
Quina quina	*quinaquina*	Bark	Fever, Malaria, Abortive	Infusions of different strengths for different purposes.
Timbó	*Derris urucu*	Juice	Icthyotoxin, Formicide, Eye infections	Apply oil extract to eye.

(adapted from Silva *et al.* 1977 and FUNTAC 1990d)

Magical Healing. The rezador is the only person in Antimari who engages in magical healing. He reports that his ability was not passed on to him by another person but is something that grew from within himself, a calling and an assurance of the ability to heal. When interviewed, he found it difficult to explain how he selects the plants that he uses to wave over the person whom he is healing and he claimed never to have thought about it. He explained that he merely walks into the forest and thinks about what is ailing the patient and then acts according to impressions he receives from nature. In treating a patient, he prays but does not always appeal to his Christian God or to Jesus. Instead, he expresses general desires that the specific symptoms of the disease be remedied. The rezador was reluctant to discuss the substance of his prayers and incantations and was generally evasive about providing specific details of the entire phenomenon of healing.

Non-Traditional Medicine

Health posts. FUNTAC established three health posts in the Antimari area, one at each of the riverside colocações Laranjal, Mapinguari, and Limoeiro but there is no health post servicing any part of the interior. Residents like the health posts and sometimes cite them, along with the schools that FUNTAC provided, as the reasons that they have not yet migrated out of the area. Each of the three posts is staffed by a single local resident who was trained in Rio Branco in the fundamentals of rural medicine through a program originally designed to treat people who live in Acre's many indigenous reserves. In Antimari, the health post workers provide primary care for the sick and injured with a special emphasis on treating malaria. In addition, at least one of the workers is experienced in wound closure. The post at Mapinguari is a separate, two-room wooden structure complete with a cot for patients. The other two posts are merely caches of medicines, bandages, and other primary care equipment located within the health care worker's home.

Industrialized pharmacotherapy. Until 1992, all industrialized medicines were bought from a patrão or marreteiro. The price was high, the availability undependable, and drugs were used erroneously (FUNTAC 1990b:47). Now medicine can be obtained free at the health posts where it can be properly administered. Table 6.2 illustrates what medicines are available at the health posts and their indications. Contraceptive pills were available at the health posts. However, in July of 1994, the stock ran out and eight women became pregnant who had been taking the pills.

Oddly, the most used medication in Antimari is a vaginal cream containing 25,000 International Units of Nistatina per gram. The trade name is Nistatina (Squibb). Nistatina is an antifungal antibiotic indicated primarily for treatment of yeast-like fungal infestations, especially *Candida albicans* (Speranza 1994). It is used topically for all cuts, scrapes, irritations, rashes, and to remove marks left by insect bites. It is well liked and local women praise its effectiveness.

Visits from healthcare professionals. There have been at least two occasions when FUNTAC assisted the community by arranging for a health care team, including a doctor, to visit the area. Each time, residents were advised via short-wave radio broadcast to meet the medical team at designated sites along the river on designated days when they could have medical problems addressed and receive vaccinations. Unfortunately, many of the more remote families refused to make the trek from their colocações in the interior because they felt that the trip would be too long for their children to endure and they would have nothing to eat and no place to sleep upon arrival. However, the majority of families did meet the canoes carrying the healthcare teams and received diphtheria, pertussis, and tetanus (DPT) inoculations which augmented the oral anti-polio vaccines given during

SUCAM visits to Antimari in the late 1980s.[3] It is interesting to note that, following each incident where people congregated to receive medical aid, an increase in the area's malaria rate occurred due to the increased inter-personal contact among these highly dispersed families.

Table 6.2. Industrialized Medicines Available at Health Posts.

Drug	Indication
Aspirin	Fever, inflammation, pain
Children's aspirin	Fever, inflammation, pain
Hydrogen peroxide	Disinfectant
Dipirona	Fever, pain
Erythromycin	Antibioic
Aluminum hydroxide	Antacid
Lidocaine	Topical anesthetic
Mebendazol	Anthelmintic
Bacitracin	Topical disinfectant
Nistatina	Vaginitis
Penicillin	Antibacterial
Potassium permanganate	Topical antiseptic
Ferrous sulfate	Hematinic for anemia
Sulfamethoxazole	Unrinary tract infections
Tincture of Iodine	Disinfectant
Oral rehydration formula	Dehydration

Dental Health

Some people in Antimari brush their teeth and some do not. Natural teeth are not cared for due to lack of knowledge of dental hygiene, lack of volition, lack of tooth brushes, and the general cultural belief that there is little that can be done to prevent tooth decay and loss. The belief in the inevitability of tooth loss is illustrated in the following riddle that is common among Antimari residents: "What does God give you twice but you have to buy the third time?" Answer: "Your teeth." Dentures are generally regarded as the cheapest, easiest, and least painful method of dental care. In addition, a mouth full of false teeth is considered far more attractive than a mouth with teeth that are rotting, broken, or missing. Furthermore, false teeth, generally a full set of uppers or lowers, are much easier to clean as they are simply removed and rinsed after meals. False teeth also aid in speech as those people with many missing teeth and no prostheses have difficulty with pronunciation. However, once the natural teeth are all gone, one no longer suffers from tooth aches so people are grateful when the last natural tooth has left their heads and they can proudly display a full set of perfect, pain-free prostheses.

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[3] There have been only two cases of polio in Antimari in the remembered past.

In 1990, FUNTAC arranged for Rio Branco dentist Flávio Honorio Ruzofa to visit four sites along the Antimari river where a total of 90 people received dental care including the removal of a total of 216 teeth. He recommended that future dental care excursions into Antimari should not be limited to the extraction of teeth but should include a large supply of prostheses.

Hygiene and methods for preserving health. Domestic and personal hygiene is highly variable from household to household. At one end of the spectrum is a family who almost never bathes and who eats on the floor with vermin-ridden dogs, chickens, a cat, and a monkey all stealing food from their plates. At the other end of the spectrum are colocações where people always disinfect their water, sleep with mosquito nets, and permit no animals in their living spaces except a cat. However, even though personal and family hygiene habits can be precarious, this fact seems to do little damage to community or individual health. Bathing is usually performed once per day at dusk and before the evening meal. A vessel such as a can or cooking pot is taken to the edge of the river or to a stream or water hole and used to douse the body which is then soaped and rinsed in the same manner. Small children are bathed at home using a bucket.

Sanitation

Water sources and treatment. Water is drawn directly from the river by those whose colocações are located on its bank. Families whose colocações have small creeks running through them use them as a water source. Those who do not live near the river and have no creek nearby dig a hole ranging in size from one square meter to one meter by two to a depth of about one to one and a half meters in a low-lying part of their colocação. This catch-pit is used for drawing water and for washing clothes and cooking utensils as well as for bathing. Some families bisect their catch-pits with pieces of wood making separate sections for drawing water and for washing.

Purification by boiling was not done in any of the colocações in Antimari. A few families use water purification drops (chlorine) that are freely available at the health posts but most do not bother. In addition, only two families possess water filters. They consist of 50-liter ceramic cisterns with ceramic filters attached to the bottom.

Waste disposal. Although they dig no privy pits, most people have a secluded area of forest near their homes designated as their latrine. Usually, a log and a supply of corn cobs are the only equipment. However, the areas never have an accumulation of waste as they are constantly patrolled by pigs and other scavengers. Thus there is no concentration of human wastes to be revisited by each family member each day and no foci for flies and disease transmission as would occur if families used outhouses.

Kitchen waste is either thrown into the nearby forest or on the bank of the river. In both cases, it is quickly consumed by local animals, usually the family's dogs, pigs, chickens, and ducks, and thus poses no health problem. Large quantities of waste are sometimes burned but households rarely generate enough trash to require this method of disposal.

Medical Cases

Dona Lúzia had a Cesarean section in 1987 and had experienced abdominal pain ever since. She had wanted to go to the city to be seen by a doctor for the last six years but her situation was difficult. The family is one of the poorest in Antimari and they have no money for transportation to the city and nothing with which to pay for treatment. In addition, as the family is not originally from Acre but from southern Brazil, they have no extended family or friends in Rio Branco so Dona Lúzia has nowhere to stay if she went into town to see a doctor.

At the colocação Natal, the male household head had conjunctivitis for over two months. He had already received three injections of penicillin with no success but has no money for transportation or treatment in the city.

At colocação Pobreza there was a woman who was blind from cataracts. In the same colocação, the husband suffered from a hernia. Both remained untreated until their deaths.

Senhor Gelson of colocação Volta da Onça, has leprosy with no feeling in his hands and feet. Consequently, he frequently injures his feet while tapping rubber. He was treated in Rio Branco for one year but became impatient with not attending his duties at home, which included caring for his elderly parents, and returned to his colocação.

Senhor Trinidade punctured his eyeball on a tree branch while working on a forest trail. He went to the city for treatment by hitchhiking on BR-364 after a three day trek from his colocação. After arriving at the hospital emergency room, he had to wait two and one half days to be seen by a doctor who was qualified to attend his eye. He passed these days in an emergency room, sitting on the floor with nothing to eat and no money for food. Finally, the doctor arrived in town, examined his injury, and said that he could do nothing for Senhor Trinidade and that he should return in fifteen days when the swelling would have been reduced. But Senhor Trinidade had no means of staying in the city for another fifteen and needed to return to Antimari to support his family.

Medical Transport

The above cases illustrate the critical problem that lack of transportation out of Antimari and to the nearest medical facility located in Rio Branco presents to area health. It is impossible to treat any major medical problems except malaria in Antimari and with no roads, no local water transportation except canoes, and no ability to pay for passage on the infrequent itinerant trading boats that travel the river, people suffer without treatment when they need it most, i.e. when they have serious or life-threatening medical problems. Women tend to have less access to transportation out of Antimari than men who leave the area more often. In addition, women are more hesitant to seek medical attention in Rio Branco because doing so means a great disruption of the family routine and great expense. As women in Antimari seldom travel alone and never out of the area, if a women must go to the city for medical treatment, she must be accompanied by another adult, either a female relative or friend or male relative. This immediately doubles travel expenses. In addition, to travel to the city women must leave their children behind either in the care of the husband at their colocação or, if available, in the care of other relatives at other sites. The situation presents a considerable amount of worry for women because there is usually no other adult female available to care for the children in her place and the men must leave the house each day to work in the fields, tap rubber, or hunt. Moreover, many women of Antimari have no relatives or friends in Rio Branco with whom they can stay while getting medical treatment and feel that it is far more difficult, dangerous, and costly for them to find a place to stay in Rio Branco than for men. Consequently, many times needy women either opt to not leave their colocações to seek medical treatment in Rio Branco or their husbands do not permit them to do so.

Nutrition

The most common indicators used to measure nutrition are dietary intake, anthropometrics, and clinical signs and symptoms. Anthropometric data collection was beyond the scope of this research but clinical signs and symptoms indicate that there is no frank malnutrition or goiter in Antimari. Neither are there any signs of vitamin C deficiency such as spongy bleeding gums. However, health post workers report that iron deficiency is sometimes found and may be associated with the chronic malaria and intestinal parasites endemic in the local population. Nevertheless, there are few complaints of hunger in Antimari. On the contrary, informants commented frequently that at least in Antimari they usually had enough to eat.

In general, dietary staples are manioc (*Manihot esculenta*) and protein from animal sources, especially a variety of wild fauna and fish both yielding fresh, high-quality protein. Wild plant foods include Brazil nuts (*Bertholletia excelsa*), various peppers for condiments, and fruits such as açai (*Euterpe oleracea*), patuá (*Jessenia bataua*), and abacaba (*Oenocarpus sp.*). These staples are harvested year round so there appears to be little seasonality to diet and nutrition in Antimari. Hunting and fishing do vary seasonally but apparently not enough to adversely affect diet. Individual family situations appear to be more of a factor in food supply and those households located in the interior fare considerably worse than their riverine counterparts. This is not due to poorer or fewer food resources available in the interior with the exception that the interior offers fewer opportunities for fishing, a disadvantage that is more than offset by the superior hunting opportunities that the interior offers. It is because households living in the interior usually consist of young families just starting out together or families who have recently moved to what is for them a new colocação. Households just starting out in the interior often do not kill adequate amounts of game despite its greater local abundance because they are poorer and may lack hunting equipment and because they are not yet familiar with the area and require time to learn the location and habits of local game. At the same time, these newly established families may be waiting for their first crops to mature and thus may not have these food resources on which to rely. Visits to some interior colocações revealed that, under these circumstances, the families were eating only wild bananas and turtles because they had no crops and no hunting or fishing gear. In such cases, the quality of nutrition can decrease and this may increase the households' vulnerability to disease. However, a 1990 FUNTAC study calculated that hunting and fishing provide up to 64.3 percent of the protein items present in the meals, divided among fish, deer, collared peccary, tapir, monkey, cutia, paca, capivara, squirrel, armadillos, turtles, and various game birds and parrots (FUNTAC 1990a:7). Game made up 47 percent of protein present at meals in the interior versus 18.3 percent on the river bank. River bank households consume fish at a higher rate (29.1 percent of non domestic meat) than households in the interior where fish represented only 13.0 percent of non-domestic meat. Game and fish off-set the low use of domestic animal protein and industrialized protein (14.9 and 2.5 percent respectively) (Martins n.d. 28). Smith (1976) gives 0.7 grams per kilogram of body weight as a minimum daily requirement for human protein consumption. According to FUNTAC's study, residents consume approximately 2.75 grams of game-derived protein per kilogram of consumer per day (FUNTAC 1990a:6,23). As the average adult in Antimari weighs

56.38 kilograms, this is equivalent to each person consuming an average of 155 grams of game-derived protein per day or over two and one-half times minimum requirements.[4] Moreover, these calculations of protein consumption do not include protein derived animal husbandry products such as pigs, ducks, chickens, and eggs. Nor does it consider protein from plants such as beans and nuts.

Dietary Taboos

The residents of Antimari acknowledge various taboos regarding the consumption of game and fish. Alimentary taboos often function to regulate hunting pressure on games species (Smith 1976). Certain species of wild animals or certain individuals within the species are generally considered taboo to some degree if they fall into one of the categories discussed below (FUNTAC 1990a:26).

Magical animals. Certain species such as the giant armadillo (*Pridontes maximus)* and the three-toed sloth (*Bradypodidae spp.*) are believed to cause death to the family of anyone who eats their flesh. Other examples of magical animals are the pink river dolphin (*Inia geofrensis)* and the gray river dolphin (*Sotalia fluviatilis*), both of whom are believed to be able to enchant and otherwise hex people or their canoes.

Repugnant animals. Revulsion of some animals is generally associated with the taste or smell of the meat or the diet of the animal. For example, all forest cats (*Felis spp.*) including ocelots, margays, oncillas, pumas, and jaguars, coatis (*Nasua nasua*), and the caimans (*Caiman crocodilus*) and (*Melanosuchus niger*) are considered repugnant because they are strict carnivores while the opossum (*Caluromys spp.*) and the porcupine

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[4] Average weight of adult males in Antimari is 60.9 kilograms (std. dev. = 5.9, min. = 50, max. = 70). Average weight of adult females in Antimari is 51.85 (std. dev. = 6.9, min. = 35, max. = 64).

(*Coendu spp.*) are repugnant because they are considered bad tasting (FUNTAC 1990a: Martins n.d.). It is interesting to note that, while we may readily understand that taste in meat is subjective, we also need to consider that revulsion for a specific species of animal based on its diet can be equally arbitrary. Most local residents will not eat forest cats because they are carnivores but relish the opportunity to feast on the very same domestic pigs that they witness eating human excrement on a daily basis. Perhaps forest cats are considered repugnant, not because of their diet, but because it is dangerous to hunt them whereas there is far less danger in killing and eating a household pig regardless of what it had for a last meal.

Salvagado animals. When large and dangerous land and water species grow extremely large, they are believed to become *salvagado*, which is to say savage, supernaturally intelligent, and immortal. In another sense, salvagado distinguishes between that which is fit and not fit to eat. Members of species usually considered eatable can become inedible or even dangerous to eat when they become overly large or dangerous. In place of being considered as food, the salvagado animal is considered a monster who eats people. It is also thought that salvagado animals are immortal, more a thing than a creature as in the case of a giant black caiman (*Melanosuchus niger*) that inhabits a certain bend in the Antimari river. It is by far the largest reptile on the river, even larger than any local canoes, and is known to be aggressive Another salvagado creature is the sultan catfish (*Brachyplatystoma filamentosum*) which can and does eat people when it gets over three meters in length (Andrade 1990).

Animals that cause sickness. Certain foods are considered *reimoso* which means that they give bad health, a condition that is not exactly the same as disease. For example, the meat of some species such as the land turtle (*Geochelone spp.*) and the sloth (*Bradypodidae spp.*), are considered *reimoso* (rheumy or bad for the blood) and felt to impede wound healing, give indigestion, or transmit disease, especially leprosy. For example, red brocket deer (*Mazama americana*), tinamou (*Crypturellus spp.*), and black caiman (*Melanosucus niger*) are all reimoso but people eat them frequently. Pregnant women are especially cautious of what they eat and pregnant women are supposed to avoid tapir (*Tapirus terrestris*), peccary (*Tayassu tajacu*), deer (*Mazama spp.*), howler monkey (*Alouatta spp.*) or night monkey (*Aotus spp*). Eating capybara (*Hydrochaeris hydrochaeris*) is said to bring sores. Sloths are believed to transmit leprosy. The previously mentioned Dona Lúzia refuses to eat turtle or red deer even though she is very fond of them. She reports that she cannot eat them because the are *reimoso* for a woman with abdominal pains and recounts her pain and discomfort when she breaks the taboo. In reality, eventual examination by a doctor in Rio Branco in 1994 revealed that she has an abdominal dysplasia after the Cesarean section. It should be mentioned that land turtles are a dependable and often-consumed component of Antimari diets. However, just as many people in North America eat rich or spicy foods because they like them despite knowing that such things do not agree with their stomachs, many people in Antimari eat animals that are considered reimoso because they especially like the taste or because that is the game that is available.

Individual and household health and nutrition are critical concerns, especially for people who live so far from modern medical care and commercial food resources. Consequently, they are important factors when families consider the relative benefits and disadvantages of choosing one lifeway over another, especially in decisions regarding migration as an adaptive strategy.

CHAPTER 7
HOUSEHOLD PRODUCTION SYSTEM

One of the main characteristics of the autonomous extractivist household is its diverse use of labor-time and locally available resources which offsets limited participation in the market. But, until we know what is produced and how and by whom, we cannot begin to understand the ethnoecology of the household production system (Netting, *et al.* 1995). In Antimari, Brazil nut collection, rubber tapping, horticulture, livestock husbandry, hunting, fishing, and other forest resource exploitation are all part of typical household production. Figure 7.1 depicts this system including physical and labor resources. Family labor is used to extract products for the forest, grow crops in horticultural plots, and tend livestock and home gardens. The forest and river also provide fish, game, fruits, medicinals, and other items of daily necessity. However, all these activities are not performed at the same time but are distributed in a complementary fashion throughout the year in accordance with the seasonality of extracted products such as rubber and Brazil nuts, crop cycles, and in accordance with changes in rainfall as outlined in Figure 7.2 and explained in the following sections.

Hunting

In a 1989 study in Antimari, hunting and fishing corresponded to 48.6 percent of the food items present at meals (FUNTAC 1989a:47). Hunting is viewed by residents as half work and half recreation although game meat and the variety it brings is highly prized and food insecurity makes it a more serious endeavor in some cases. Nevertheless, hunting remains probably the least secure of all subsistence activities. Yields among households in

Antimari are extremely variable and reflect differential game density, seasonality, the effects of weather and the hunters' ability as well as their knowledge of the local area and of the game pursued. This can include hunters' capacity to imitate calls and sounds, read tracks and signs, understand what animals eat and when, and know the location of plants on which game feed. This is why hunters are less successful when they move into new, unfamiliar colocações.

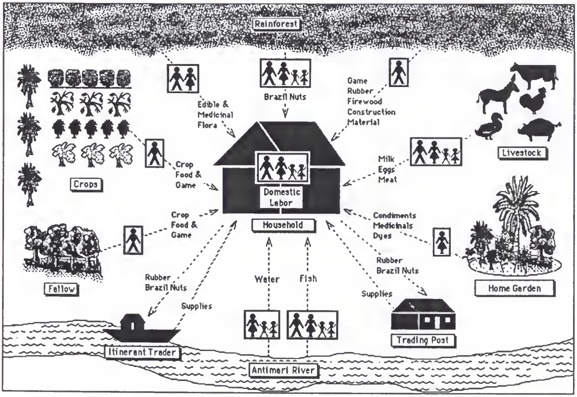

Figure 7.1. Household Production Diagram for Antimari.

Game Availability

Even during the daytime, until about 1990, hunters in Antimari could successfully encounter game within 30 minutes by merely walking along the area's many trails. Now one seldom sees game during the day, and hunters must hunt at night by lying in wait. However, despite using dogs or waiting in ambush all night, it is sometimes difficult to encounter game. In 1989, FUNTAC conducted a faunal study and measured the densities of 51 local animal species and found that all of the species hunted in the Antimari area had lower population densities than those found in two other rainforest areas to which they were compared. It was also noted that two species that are very sensitive to hunting pressure, the black spider monkey (*Ateles paniscus*) and white-lipped peccary (*Tayassu pecari*) were not found at all in the Antimari area (FUNTAC 1990a:7). But hunting pressure on local game species had been greatly relieved by 1994 since more than half of Antimari's families had emigrated. In addition, the black spider monkey had returned, even to the more frequently hunted riverine areas. Table 7.1 reflects species and quantity of game taken during a one year period. As informants do not keep records, responses represent only gross estimates.

Table 7.1. Game Taken in 1994 in Antimari.

Animal	Mean Quantity Taken	Std. Dev.	Min.	Max	Total	N.
Deer	8.39	19.15	0	100	277	33
Peccary	13.59	21.64	0	100	435	32
Armadillo	2.78	7.27	0	30	89	32
Tapir	0.38	0.71	0	2	12	32
Capybara	0.45	1.18	0	5	15	33
Guan	10.22	21.84	0	100	327	32
Tinamou	6.38	6.61	0	25	204	32
Land Turtle	15.88	33.54	0	150	508	32
Paca	14.09	36.11	0	200	465	33
Monkey	4.00	17.34	0	100	132	33

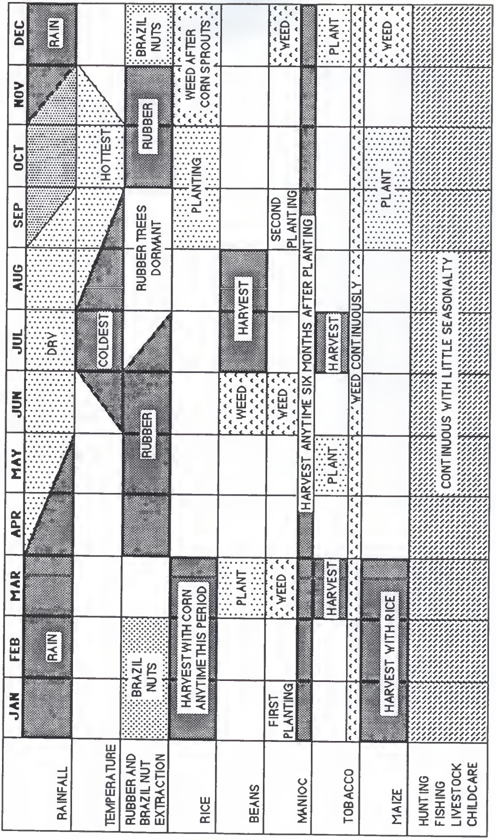

Figure 7.2. Household Production Calendar

Major Hunting Technologies and Tactics

Weapons and ammunition. Single-shot, .28 gauge shotguns are the only firearms used by residents of Antimari. Despite the diminutive caliber, residents successfully use these weapons to kill jaguar (*Panthera onca*) and game as large as 225 kilogram (496 pound) tapirs (*Tapirus terrestris*). Their relatively low cost and versatility, coupled with the fact that hunters can make their own ammunition for them, make shotguns a clearly superior choice for local households.

Ammunition is reloaded at home, the task usually falling to an older son. Commercially produced shell casings are reused after removing the spent primer cap and replacing it with a new, commercially produced cap. The shell is then filled to approximately half-full with smokeless gunpowder and tamped with a wooden dowel. The powder is then held in place with wadding made from the soft fibers of various plants. The remainder of the shell is filled with lead shot or stones and is capped with a plug of bee's wax. The only recurring expense involves buying primers and powder at about US$6.59 per 100 grams in July, 1994, enough for loading approximately 80 rounds.

Hunting along trails. Called *casada á ponto*, this type of hunting is done on specific patrols, while tapping rubber or collecting Brazil nuts, or while traveling from one colocação to another. Hunters enjoy a 62.2 percent kill rate if game is found while walking along forest trails. The average hunt lasts 3.4 hours (min. = 2.9, max. = 8.9) and the locations preferred are bamboo stands (46.8 percent) and restinga (37.8 percent) (Martins n.d.).

Hunting by ambush. Ambush hunting is used to acquire deer (*Mazama spp*.), paca, and red-rumped agouti (*Dasyprocta aguti*). Ambush tactics are usually used at night near horticultural plots, fruiting trees, or near a stream with banks that are rich in salt-bearing soil. Other preferred sites are places where game feed such as fruit trees, garden plots, and fallows. Hunters usually climb a tree, string a hammock in which to rest, and wait quietly for game to arrive. When hunters hear game approach, they shine a flashlight into its eyes to startle it and fire their shotguns. In ambush hunting, selectivity of game species is greater because the hunters can wait near different game attractants such as places to eat, drink, or sleep to hunt selected species because different attractants draw different species. Local residents have a great knowledge of what plants are preferred by various species so they can select for desired game. The average time per hunting trip is 3.2 hours (min. = 2.5, max. = 6.3) (Martins n.d.).

Hunting with set-guns. Set guns, called *armadilhas*, are employed when hunting tapir, armadillo (*Dasypus novemcinctus*), and paca. A shotgun is placed on forked sticks at the height of the intended game and a tension-set sapling is used to pull the trigger. When no gun is available an old shotgun barrel is used in its place and a nail is employed as a firing pin. Upon firing, the nail is rammed into the rear of the shell by the springing of a tension-set machete blade. In armadilha hunting, game selectivity is large as each species has its own trail which the hunter can use to select for individual species. The weapon is placed so that the trip cord and blast will intercept a game runway. It is set in the evening at about sunset and is always retrieved early the next morning in order to minimize the danger of a person setting off the gun and in order to minimize the gun's exposure to the elements. It is also always set with consideration for local dogs and pigs. This usually means that it will be placed on the opposite side of a water barrier such as a stream or marshy area that pigs and dogs are reluctant to cross. Sites preferred are bamboo stands, scrub land, and any known game trails. Despite the obvious advantages of passive hunting devices such as the armadilha, about 40 percent of local hunters never use them as they are concerned about accidents when a person or dog treads on the trip wire or when the weapon accidentally discharges due to rain altering the trip mechanism tension.

Hunting with dogs. Dogs are used by some hunters to find, pursue, and hold game at bay. In hunting with dogs, the selectivity leans toward more slow moving species such as agouti, paca, land turtle (*Geochelone denticulata*), and tapir many of whom hide in thickets and are difficult to locate without dogs. Dogs also accompany men as they go on collecting trips in the forest or go to work in horticultural plots where they alert on game. However, their use is not well thought of by all hunters because many feel that dogs scare away all game in the immediate area. In addition, encountering some species such as forest cats, giant anteaters (*Mymecophaga tridactyla*) or sloths (*Bradypus spp*.) is dangerous for dogs as these species are known to rip them to death with their claws. Consequently, only about half of the area's dogs were used for hunting and only 4.8 percent of hunts surveyed involved their use. Average hunt time is 3 hours (min. = 2.8, max. = 7.8) (FUNTAC 1990a:25, Martins n.d.).

Different hunting tactics yield different results. Hunting by chance encounter while walking along forest trails, results in a greater variety of species killed while hunting by ambush results in less variety of species but a greater number of meals per animal killed because larger animals are taken using this tactic (FUNTAC 1989b:48). Table 7.2 shows the relative efficiency of the above-delineated tactics.

Table 7.2. Relative Efficiency of Different Hunting Technologies.

Type of Hunting	Average No. Individuals Captured/hr.	Average No. Meals Captured/hr.	Average No. Kilos. Protein Captured/hr.
Ambush	4.88	37.89	81.09
Set gun	2.6	19.13	74.9
w/Dogs	3.33	27.33	29.49
Walking	5.46	17.38	29.65

(Martins n.d.:19)

Species of greater importance as game have lesser densities due to hunting pressure. Their relative scarcity sometimes forces hunters to select other game in accordance with its availability. For example, most hunters say they are going out to hunt deer or tapir and may spend much of their hunting time trying to acquire these species. However, if unsuccessful they may opt to hunt for another, more easily acquired, species and change their tactics accordingly in order to not return home empty handed. This strategy, along with opportunistic encounters, account for a large portion of game taken.

Selection of hunting environment also depends on game selection. For example, the water's edge is best for ambushing deer, jacu (*Penelope spp.*), and red-rumped agouti, while areas dominated by bamboo are best for hunting those species most easily taken by pursuit, either alone or with dogs. Game trails and horticultural plots are good locations for hunting pacas and armadillos while areas of frequent flooding (várzeas) are favored places for finding land turtles and for hunting capybara (*Hydrochaeris hyrochaeris*) with the assistance of dogs or by ambush.

Time Inputs and Yields

Hunting efficiency can be evaluated by the number of animals killed, total number of meals, or liquid weight of meat per adult hour of time invested in its acquisition. In terms of the number of individuals taken, hunting by walking trails brings a greater return as it brings in the greatest variety of species. Ambush hunting comes in second in variety of game taken. As far as the number of meals provided, or liquid weight of meat brought home per hunting hour invested, hunting with dogs and the armadilha are superior as these technologies select for larger species such as taper and capybara and have a high success rate and high rate of return on time invested (see Table 7.2) (FUNTAC 1989b:47, Martins n.d.:19). Again, it should be remembered that not all hunting can be considered labor as it is also thought of as recreation.

Fishing

Fishing is viewed by men, women, and children as a pleasant activity and is considered a leisure option by all those who were interviewed. Fish comprise over 20 percent of protein intake with some households along the river eating more and some in the interior almost never having the opportunity to fish. Approximately thirty-three different species of fish are consumed in the Antimari area. The most frequently caught species are listed in Table 7.3.

Fishing Technologies and Tactics

Hooks and lines. Fishing by hand with commercially produced monofilament line, a lead weight and no. 4 hooks accounts for 73.8 percent of fishing in Antimari. Baits used include earthworms, fish, meat and tapioca. This type of fishing is done mostly in the Antimari river (59.1 percent) but also in ponds (22.8 percent) and small streams (12.6 percent). Time spend in this activity is divided almost equally among men and women (51 and 49 percent respectively) (Martins n.d.).

Gill nets. Setting vertical nets, or *malhadeiras*, in local waters represents 12.2 percent of total fishing done in Antimari. Commercially made nylon nets of large gauge, are used to prevent damage by piranhas, and are set in the river (52.4 percent) and ponds (38.2 percent). They are placed in the river in the early morning near areas of aquatic vegetation and retrieved at the end of the day. When used in ponds, nets are set in the late afternoon and retrieved the next morning. Males represent 76.9 percent of people who employ this technology.

Cast nets. Thrown in lakes (55 percent), the Antimari river (25 percent), and small streams (20 percent), cast net, or *tarefa*, use represents 11.6 percent of local fishing and is an exclusively male activity (Martins n.d.).

Table 7.3. Fish Species Most Frequently Caught in Antimari.

Common Name	Scientific Name	Percentage of all Fish Caught
Mandi	*Pimelodus sp.*	11.94
Piau	*Leporinus spp.*	8.98
Traíra	*Hoplias sp.*	9.23
Lirio	*unknown*	4.49
Surubim	*Pseudoplatystoma sp.*	3.21
Piranha	*Serasalmus sp.*	3.13
Cará	*Cichlasoma sp.*	8.56
Caruaçu	*Astronotus ocellatus*	8.30
Jeju	*Erythrinus sp.*	8.47
Pacu	*Myleus sp.*	6.78
Tucunaré	*Cichla sp.*	3.97

(adapted from FUNTAC 1990a)

Machete fishing. This technique consists of lying in wait or stalking a large fish in a shallow lake or pond during the dry season and striking it with a machete. Incidence of this type of fishing is very low, only 1.8 percent of total fishing. It is done mostly by older men with those over 50 years of age accounting for 33.3 percent of occurrences.

Poisonous vines. Timbó (*Derris spp.*), a vine that is usually used as a dye in Antimari, is used by many traditional Amazonian people as a piscicide. Fishers beat the vine to a pulpish paste and throw it into small, enclosed bodies of water where it impedes fish's breathing to the point that they float to the surface to be speared or gathered by hand.

Poisons are rarely used because they kill all species indiscriminately and there was only one incident of their use in Antimari.

Time inputs and yields. People spend an average of four hours fishing on each trip and men generally spend 44.4 percent less time fishing than women (FUNTAC 1989a:47). Yields average 3.3 meals per trip using vertical nets and cast nets yield 2.1 meals per fishing trip but few people can afford this costly equipment. Hook and line are more affordable and yield 2.4 meals per trip (FUNTAC 1990a:6).

Rubber Production

Tapping Acre's native rubber trees, *Hevea brasiliensis*, depends on their density and location. They do not occur in stands but at densities of only one to three trees per hectare. Standing thirty to fifty meters in height, they are usually found on well-drained soils that are never flooded. In Antimari, land that has rubber trees in economically sufficient density is divided into colocações containing over 545 trails connecting 62,000 adult rubber trees at an average of 114.59 trees per trail and yielding an average of 7.9 kilos of latex per tapping day. In Antimari there is an average of 6.97 (std. dev. = 3.62, min. = 2, max. 17) rubber paths per occupied colocação but not all of them are tapped.

Seasonality. Rubber tapping normally occurs between the months of April and July and October to December with variances depending on micro-climates and the intensity and duration of the rainy season. Production drops during August and September due to the flowering and subsequent dormant period of the rubber trees when their latex does not flow. During this period, tappers generally do not tap trees but use the time to work in other activities. In addition, no tapping is done from January through March because it is too rainy, making travel along footpaths difficult, ruining latex because it will not coagulate after contact with water. The termination of the tapping season signals the beginning of the Brazil nut harvest season between the months of December and March.

Technology of Rubber Tapping

Tree and trail preparation is normally done in March, shortly after each rainy season. The undergrowth and clinging vines are removed from around each tree and bridges over forest streams are also repaired and readied for use at this time. The actual rubber tapping usually begins in early April and lasts through July and then again in October and November. A typical daily routine during the tapping season consists of the tappers, with kerosene lamps on heads and shotguns in hands, leaving their dwellings at about three or four o'clock in the morning and walking from tree to tree along trails up to fifteen kilometers long that loop through the forest and end where they began at the households' dwellings. Traveling the entire length of the trails will take the next twelve to fifteen hours. As they reach each tree, they cut a diagonal incision, called a *sangria*, through its bark to the cambium layer. The latex, which the tree naturally secretes as a defense against pathogen invasion, flows downward to the end of the cut and is collected in either a plastic cup, a section of cut bamboo, or a Brazil nut capsule that has been cut in half.

Traditionally, tappers hiked the tail again the day after tapping and emptied the collection cups into a can or bucket and then went home to cure it by pouring it slowly onto a pole over a smoky fire, a slow, tedious and unhealthy process. The smoke coagulated the latex onto the pole and the result was a ball of rubber weighing about 60 kilos. An alternate method of curing latex consists of adding a small amount of acetic acid which causes it to coagulate almost instantly. However, no one cures rubber by the traditional method in Antimari and no one has money for, or access to, acetic acid. Instead, local tappers leave the latex in the collecting containers until it coagulates naturally in about two weeks if no water contamination prevents the process. Then they press the resulting *biscoitos* or biscuits of rubbery latex in a simple, hand made, wooden press for about eighteen hours to remove moisture and fuse them into 60 by 40 cm. (23.6 by 15.75 in.) blocks weighing approximately 50 kilos (110.2 pounds). These blocks are then carried on the tappers' backs to the riverbank where they are sold at trading posts.

Rubber is tapped six days per week during the tapping season for an average of 194.7 days per year in Antimari (std. dev. = 57.1 days). Residents of Antimari's 35 occupied colocações produced 8,469 kilos of rubber during the 1993 tapping seasons. However, twelve of those 35 households did not tap rubber at all, leaving an average of 368.2 kilos produced per tapping colocação using an average of 281.93 adult days of labor per colocação.

Brazil Nut Collecting

Although Brazil nuts are eaten whole and used extensively in cooking, their collection has been primarily aimed at market sale. Because national consumption is very low, demand depends mainly on the international market (Arias 1996:21). After rubber tapping, Brazil nut production is traditionally the second most intensive market-oriented activity in Antimari and Brazil nuts are the second most important non-game product extracted from the environment.

Brazil nuts are produced by the tree, *Bertholletia excelsa*, which is native to the Acre region. Although ecological conditions are apparently identical in the basins of the upper Juruá and the upper Purus river systems, for reasons still unknown, Brazil nut trees are found only in the latter territory despite indications that indigenous people at least passively encouraged them to prosper near many locations of human habitation (Nissly 1966:34, Smith *et al.* 1992:391). Furthermore, Brazil nut trees are not evenly distributed where they are found but occur in stands of up to about 100 individuals. In Antimari, these stands are crosscut by rubber tapping trails, each leading to an average of 9.2 Brazil nut trees with an average DBH of 113.2 cm. Interviews revealed an average of 115.89 (std. dev. = 108.43) Brazil nut trees per colocação although it must be noted that these trees do not occur homogeneously throughout the area as reflected by the high standard deviation. Some colocações produce enough nuts to sell while others produce only enough for family consumption. Still other colocações are completely devoid of Brazil nut trees and thus produce no nuts.

The nuts are actually the tree's seeds and are found in woody, fist-sized capsules called *ouriços* that drop from the canopy. These capsules are so hard and heavy, up to 1.4 kilos (3 pounds), and fall from such a great height (up to 50 meters), that it can be dangerous to walk under Brazil nut trees at certain times of the year.

Brazil nuts are collected from December through February, the off-season for rubber tapping. Collection is usually a family project with all members over about age five years actively participating. The collection season makes it necessary to devote all available manual labor to nut collection and processing during this time. Thus, the division of labor is almost even between males (52.33 percent) and females (47.68 percent). Collectors first locate Brazil nut trees in their colocações and slash and burn the area of ground underneath them in a 30 meter radius in order to better locate the capsules when they fall. This action also aids the tree because plants competing for soil nutrients and parasitic vines are removed. When the capsules fall, they are collected and chopped open with a machete. The standard unit of measure for collected Brazil nuts is a *lata* or can. This holds approximately 18 liters (4.75 gal.) of nuts weighing about 12 kilos (26.45 lbs.). An adult requires about 30 minutes to open enough Brazil nut capsules to fill one lata. Production yield varies greatly from year to year, but during the 1993/1994 harvest, the average number of latas of Brazil nuts produced for all households was 127.23 (std. dev. = 174.15). However, 13 of the 35 then-occupied colocações (37.1 percent) did not produce any Brazil nuts at all during this period. Of the households that did produce Brazil nuts, average production was 179.27 latas but again, production varied so much from colocação to colocação that the standard deviation from this mean was 183.17 latas with the minimum any single household produced being 12 latas and the maximum 680 latas.

Having little or no market for the nuts, there is a surplus for household consumption which gets distributed among all local families. People eat the nuts raw or grate them into manioc water in which they cook meat and fish. The nuts could be pressed and the oil used for cooking, as lamp fuel, or to make soap, but they are not despite complaints about the cost of kerosene and industrialized soap.

Horticulture, Gardens, and Animal Husbandry

No group of people have ever been directly observed living independently of farming in a rainforest environment (Bailey *et al.* 1989:59). Households of Antimari are no exception and fit well into the category of subsistence horticulturalists because their farming technology does not include the use of animal traction, artificial irrigation, pesticides, herbicides, or complex tools such as the plow (see Gudeman 1978, Keegan 1986:92, Johnson 1989:50-51). Instead, they traditionally practice shifting cultivation using slash and burn techniques wherein, producers, the means of production, and the product, are for the most part, kept within the household and any extra-household labor is reciprocal. Moreover, although substantial surpluses are produced, most are not marketed.

As mentioned earlier, when patrões controlled local rubber tappers in the past, horticultural activities were discouraged in order to allocate more available labor time to extractive activities, keep workers dependent on the trading post, and increase profits through the sale of industrialized supplies via usurious credit arrangements. Often, more profit was made by furnishing supplies than through buying rubber and Brazil nuts because, while rubber and Brazil nut prices fluctuated, the need for supplies did not. However, subsistence horticulture currently provides families with food security, self-sufficiency, and empowers households to some degree as it ameliorates dependence on supplies purchased through credit. If residents can grow food, they do not have to buy it and can avoid at least some debt to traders. In addition, horticulture is complementary to extractivism because, with the exception of Brazil nuts, families cannot eat what they extract and have difficulty selling what they grow.

Horticulture and Gardens

Residents cultivate crops by using the traditional system of *roçado*, which is a form of farming wherein the chosen plot is first cleared of underbrush and vines, then all trees except Brazil nut trees are felled and left in place to dry. After a few weeks, the brush and felled trees are burned and the remaining material is concentrated and reburned. This clearing and burning process leaves a fertilizing layer of ash on the soil. Unfortunately, it also exposes the soil to sunlight and wind and promotes erosion and leaching. However, the initial use of a plot enjoys hearty growth due to nutrients in the ash. Later, fertility continues due to the slow decomposition of large detritus but a marked decrease in yield can be seen after the second planting. Antimari residents reported that they abandon their plots to fallow when yields decline and not when or because the plots get choked with weeds to the point that opening new land is easier than weeding the old plot as happens elsewhere. This indicates low soil fertility. Plots are used for an average of 2.38 years (std. dev. = 0.38 years) and then left to fallow for 17 to 20 years. A new patch, either a formerly abandoned plot or climax forest, is then cleared and a new cropping cycle begins. This system is more appropriately called swidden-fallow agroforestry because, in addition to short term staples, the plots include various tree species that continue to grow for a number of years after the sites are left to fallow. Animals continue to feed on these trees so the fallow remains a good hunting site. Thus the entire system is a combination of annual crops, perennial tree crops, and natural forest cover. A total of 48.5 hectares of Antimari land had been planted in 1994 with the average colocação devoting 1.57 hectares to crops (std. dev. = 1.04 hectares, min. = 0, max. = 18). Table 7.4 delineates crop production, sale and consumption for one year for the 35 colocações that were occupied in 1993. With local rubber and Brazil nut demand low and prices unprofitable, residents can devote more time to horticulture and livestock raising. Some households plant crops that are unsuccessful. Some fail to mature because of wind damage, old seed, weed invasions, bird attacks on rice, and fungi and ant attacks on beans. However, most households are producing beyond their consumption needs. Most noteworthy is the variance in the amount produced among different households. Extremely high standard deviations from production means reflect a wide variety of production, consumption and sale situations among colocações. For example, while one family produced 8,000 kilos of rice in one year, two other households produced none. Furthermore, the average amount of rice produced above household consumption needs was 913.03 kilos per household but only 21.19 percent of this surplus was sold.

The same scenario is more starkly portrayed by bean production figures where average annual production per household was 124.24 kilos but some colocações produced up to

Table 7.4. Horticultural Activity in Occupied Colocações in Antimari in 1993.

Crop	Mean	Std. Dev.	Min.	Max.	Sum	N
Rice Produced (kilos)	1290.91	1970.46	0	8000	42600	33
Rice Sold	193.55	737.99	0	4000	6000	31
Consumption per Month	31.49	23.28	0	100	913.33	29
Beans Produced (kilos)	124.24	445.97	0	2500	4100	33
Beans Sold	3.13	17.68	0	100	100	32
Consumption per Month	12.24	14.28	0	50	355	29
Manioc Flour Produced (kilos)	1746.33	2322.36	0	10000	52390	30
Manioc Flour Sold	1228	2801.42	0	10000	30700	25
Consumption per Month	65.43	49.36	10	250	1766.5	27
Maize Produced (kilos)	1166.67	1015.17	0	4000	35000	30
Maize Sold	74.71	217.03	0	1000	2316	31
Consumption per Month	118.3	131.97	0	500	2957.5	25
Coffee Produced (kilos)	85.88	487.26	0	2800	2834	33
Coffee Sold	0.03	0.18	0	1	1	32
Consumption per Month	1.23	1.75	0	10	38	31
Tobacco Produced (kilos)	6.25	19.63	0	100	200	32
Tobacco Sold	0.29	1.62	0	9	9	31
Consumption per Month	0.369	0.544	0	160	110.67	30
Honey Produced (liters)	37.2	199.8	0	1132	1190.5	32
Acai Produced (liters)	9.31	17.03	0	52	298	32
Patoa Produced (liters)	3.71	9.99	0	52	115	31
Abacaba Produced (liters)	12.55	28.12	0	120	414	33

2,500 kilos while a full 28 of the 35 occupied colocações grew no beans at all. It is not possible to grow this staple in many colocações due to pest attacks and poor soil conditions. Even among the seven households that did grow beans, the average production was 585 kilos but the standard deviation was 863.63 kilos owing to the wide range of household production levels (min. = 70 kilos, max. = 2,500 kilos).

Another staple, manioc flour, shows the largest production with one household producing ten tons. Furthermore, average production minus average consumption shows an average surplus of 961.1 kilos despite figures for average sale of 1,228 kilos. Not surprisingly, the standard deviations were much higher than the means for these calculations and reflect that some households produced none while others produced over twelve times the quantity needed for domestic consumption.

Conversely, figures for maize reflect an average production that is 17.82 percent lower than the average consumption of 1,228 kilos per year.[1] Moreover, the same wide variation in the amount produced and sold by different households renders mean figures less than informative. Figures for coffee and tobacco production and consumption follow suit. What is important to understand is that horticultural production varies greatly from colocação to colocação with many families not producing at subsistence levels. Nevertheless, even among households that produce many times their needs, much of the surplus production is not being transformed into profits due to the paucity, high cost, and difficulty of transport to markets.

Gardens. It is usually men and older boys who are responsible for horticultural production. However, theirs is not the only labor devoted to cultivation. Women plant and tend small kitchen gardens which produce a larger variety of plants than horticultural plots even though their yield is much smaller by volume. Called *jiraus*, the gardens are usually raised off the ground to keep out yard fowl and may even be protected by an old mosquito net. Many households use an old dugout canoe filled with earth. Others make a shallow box about one meter by two in size. It is in these protected but accessible structures that women plant a dense intermixture of vegetables such as tomatoes and onions; condiments including peppers, coriander, and garlic; and medicinal plants.

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[1] Although consumption figures for maize reflect that the average family uses 3.89 kilos (8.58 pounds) of maize per day, almost all of it goes to feeding pigs, ducks, and chickens.

Animal Husbandry

Households also raise chickens, ducks, pigs, and occasionally cattle. Table 7.5 shows annual livestock production figures. Although preferred for the richer taste of their meat and eggs, fewer ducks are kept than chickens because ducks are not as wary as chickens and get killed by forest and river predators including snakes, raptors, forest cats, fish, and caimans.

Pigs are sold on rare occasions but there is no local market for pigs and boatmen that agree to transport them to the city charge exorbitant fees because pigs are considered filthy and difficult to handle in rivercraft. Nevertheless, local households consider keeping them as a hedge against periods of financial or dietary need and are proud of the number of pigs that they own (Arias 1996:134). An added benefit to keeping domestic swine is the service they perform by eating garbage, feces, and any other household waste. However, their control is a major problem with pigs getting into, and at times destroying gardens.

Table 7.5. Annual Livestock Production in Antimari.

Animal	Mean Quantity per Colocação	Std. Dev.	Min.	Max.	Sum	N
Chickens	37.06	33.76	0	140	1223	33
Ducks	8.47	15.52	0	80	288	34
Mules	0.14	0.43	0	2	5	35
Horses	0.15	0.44	0	2	5	34
Cattle	3.39	5.77	0	26	112	33
Pigs	9.09	11.36	0	55	309	34

Artisanal Production

The vast majority of artisanal production is done for use within the household of origin. All production is for utility and none for the sake of decoration or art. Turtle shells are made into bowls and vines are used for lashing, bound into brooms, or woven into baskets and sieves. Other commonly produced items are tool handles carved from local woods and manioc graters made by setting nails in wooden planks. As previously stated, men and boys make shotgun loads and armadilhas for hunting. However, nothing is painted, dyed or otherwise decorated. Women constantly alter and repair family clothing and many households possess treadle-driven sewing machines. Some women make brooms and trade within Antimari for chickens while some men make basket backpacks and occasionally trade with other residents for something of value. But their manufacture cannot be construed as part of overall income-generating production strategies because transactions are infrequent and, although there is negotiated compensation, the items are made more as a favor than as commercial enterprise with the exception of dugout canoes which are very labor-intensive to construct and made only on a contract basis. Neither is there any incentive to produce artisanal goods for local sale as residents do not buy from each other because they have no money and because, again with the exception of canoe-making, what one person can make everyone can produce for themselves. Moreover, itinerant river merchants have no interest in buying any locally produced handicrafts. The only external markets would be in the cities of Sena Madureira and Rio Branco but round-trip transportation costs of the products would outweigh income generated from market sale.

However, another type of artisanal production that is invaluable to Antimari residents is construction. Men make cane and manioc presses, one family has built a two-wheeled cart, and almost all families build their own houses. Dwellings in Antimari consist of split pole floorings set on posts over one meter off the ground as a defense against animal intruders. Roofing material consists of split and folded fronds of the açaí da mata palm (*Euterpe precatoria*), a large tree found isolated in the terra firme that is also used for fruit and palm heart; or the jarina (*Phytelephas macrocarpa*), an exceptionally tall palm found in open areas. Flooring is made of split sapling or of paxiúba palm (*Socratea exorrhiza*) with a duration of eight to ten years. If the dwelling is to have walls, and many do not, they too are made of split sapling or of sawn boards in the case of a few houses along the riverbank. The food preparation area is built at the rear of the house which is kept open in order to provide a draft for smoke and to better facilitate throwing water and garbage down into the yard.

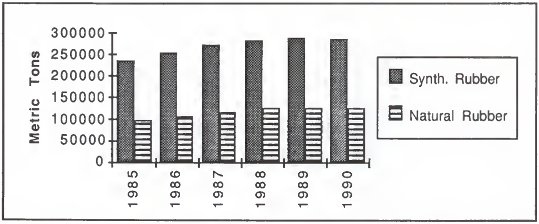
Houses last between 8 and 12 years. By then, the roof thatch gets thin, the floor poles split and break, and it is time to build a new dwelling. Another incentive to abandon the old house after about ten years is the infestation of cockroaches and other insects that live under the house and in the thatch by day and crawl over everything and everyone at night. After a decade of multiplying, the nightly incursion by these pests makes sleeping in the house increasingly uncomfortable. The labor for house building usually consists of the males of a household augmented by relatives or men from other colocações. Because sound reasoning probably went into selecting the site for the original house with consideration of drainage and breezes, the new house is usually built within 20 meters of, and many times right alongside of, the old one.

Hunting, fishing, horticulture, animal husbandry, and the extraction of rainforest products for commercial sale, all reflect the particular combination of opportunities and constraints presented by the natural and economic environment at a specific time. While the resources of the natural environment remain relatively static, the degree and type of economic opportunities and constraints governing local households' articulation with markets for extracted products change in accordance with price and demand. As extractivists have no control over these factors, they are compelled to alter their household production strategies in order to adapt to market changes and maintain their livelihood. Specific adaptations that were chosen by residents of Antimari in the face of economic adversity are discussed in the following chapter.

CHAPTER 8
CRISIS AND ADAPTATION

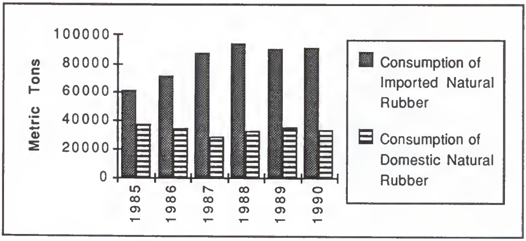
Economic Crisis

As previously stated, beginning in the 1980s, Brazil underwent the worst economic crisis in its history and the resulting economic inflation soared as high as 5,000 percent per year. This was primarily due to constantly shifting government economic polices which included continual adjustments to wage and price indexes and six currency changes in less than a decade (McCluskey 1997). For example, prior to 1980 prices for rubber were set largely according to the national inflation rate indicated by the General Price Index (IGP). Yet after 1980, the government adjustments failed to keep pace (Bernades *et al.* 1990:93). The resultant devaluation of rubber in Antimari would have been debilitating enough in its own right. However, any downshift in official prices translates into an even greater negative adjustment of forest gate prices of extracted goods in order to cover fixed costs such as transportation and storage. Furthermore, national demand for natural rubber extracted from the rainforest was not improving during this period. As Figure 8.1 illustrates, Brazilian consumption of natural rubber continued to be outdistanced by the use of synthetics. Worse yet, consumption of natural rubber from domestic sources was being dramatically surpassed by consumption of natural rubber from other countries as shown in Figure 8.2. In addition, the portion of demand for domestic natural rubber was being increasingly overtaken by cultivated plantations in the south of Brazil which produce a less-expensive, better quality product than that which comes from extractivists in the Amazon basin. Brazil is a net importer of rubber so there is no external demand for any of its native rubber (Knight-Ridder Financial 1996:225, IRSG 1996).



(adapted from IBGE 1989, 1994)

Figure 8.1. Rubber Consumption by Type in Brazil, 1985 - 1990.



(adapted from IBGE 1989, 1994)

Figure 8.2. Consumption of Domestic and Imported Natural Rubber, 1985 - 1990.

Brazil's runaway inflation was a double-edged sword for residents of Antimari. Not only did it adversely affect the relative value of extracted products that local families needed to sell, it destroyed the credit system on which they depended to overcome the seasonality of income from extractivism. Trading posts and itinerant river traders traditionally supplied local families with industrialized goods on credit against future household production. However, despite the exorbitant prices they set for industrialized goods and the rapacious interest rates they charged, the soaring cost of inventory destroyed creditors' capacity to delay in receiving payments from rural people because any passage of time would cut the value of the amount paid to only a fraction of what the goods were worth when originally purchased. The result was that the traditional credit system that, although exploitive, had successfully maintained commerce between local families and the outside economy for decades no longer functioned well enough to support continued trade with the people of Antimari on any more than a casual basis. The effect was that the area's traders greatly diminished their economic involvement with Antimari's households and severely curtailed credit.

Although local families who depended on them felt abandoned, the traders were not malicious in their actions but were themselves making rational adaptive decisions based on their perception of overall economic conditions and their own financial situations. An indicator of how difficult the prospects for continued trade was the fact that Antimari's two patrões-turned-traders decided that it was in their best interest to all but abandon trading in Antimari and move to the city even though such a move meant relinquishing the colocações that they still owned and not collecting debts owed to them by local residents. These two traders had accounted for almost half of the economic activity in Antimari. The effect of their greatly reduced trade was that residents had far less opportunity to sell their extracted goods and secure industrialized necessities. Furthermore, credit was less available and there were even fewer means of transportation in and out of the area.

Adaptation - Fight or Flight

No form of market link replaced the traders and itinerant merchants after these economic intermediaries reduced their involvement in the area. The result was that many of the households in Antimari had no one to whom to sell their extracted products and no one to extend them credit toward the acquisition of industrialized necessities. These factors, combined with a lack of assistance from the state, Antimari's relative geographic isolation, and the everyday adversities of traditional rural life, have reduced the economic capacity of the local population and diminished their standard of living. Local residents have met this crisis by adopting socioeconomic strategies that can be termed fight or flight. They have either fought by staying on their lands in the rainforest, or opted to migrate in hopes of a better life elsewhere.

Fight - Local Adjustments in Production Strategies

One local reaction to changing demand for rainforest products was to curtail extractivism. As a result, by 1994, 34.3 percent of Antimari's remaining residents were no longer tapping rubber and were collecting Brazil nuts only for household consumption. Some residents were still tapping rubber only out of necessity. Despite poor returns on their labor and market opportunities, they had no other way to generate income to pay for industrialized essentials that were becoming increasingly expensive due to the rising rate of inflation.

Changes in rubber and Brazil nut production. Only 35 of the area's 91 colocações were still occupied in 1994. The resident families' production activities still centered around subsistence horticulture and livestock husbandry, hunting and fishing, tapping rubber trees, and collecting Brazil nuts. But Antimari was in a transition away from traditional extraction based on producing rubber.

In 1991, all but 15 (24.2 percent) of Antimari's 62 households were tapping rubber. By 1994, eleven out of the area's remaining 35 families (31.4 percent) were no longer engaged in this kind of extraction. Not only had the number of families still living in Antimari declined by 43.5 percent due to out-migration, but the percent of families who had opted to discontinue tapping rubber altogether had increased. In addition, while the average number of kilos of rubber produced per year per producing family in 1991 was 555 (std. dev. = 296.7), only an average of 264.66 kilos (std. dev. = 347.33) were being produced per producing family in 1994. Although not statistically significant, these data represent a 52.4 percent decline in average household rubber production. Moreover, the extremely high standard deviation for the 1994 average implies more variation in production among households for that year than in 1991. Other survey data explain the reduction in rubber production in part by revealing that the average number of adult-days of labor per family per year devoted to rubber tapping declined from 205.2 adult-days (std. dev. = 259.14) in 1991 to only 164.46 adult-days (std. dev. = 168.59) in 1994, a decline of 19.85 percent. Thus, by 1994 Antimari's households were devoting fewer days per year, and a lesser portion of their available labor, to tapping even though, among those families still tapping, the average number of days devoted to rubber production, 172.0 days in 1991 (std. dev. = 91.7) and 194.8 days in 1994 (std. dev. 57.1), did not change significantly (see Appendices B and C). Conversely, the average production of Brazil nuts per household rose from 44.91 latas (538.9 kilos) in 1991 to 127.23 latas (1526 kilos) in

1994 despite producers having fewer opportunities for market sale. The increase may be partially explained by the fact that migration within Antimari tended to move toward colocações that were richer in extractive resources.

Changes in horticultural production. Data regarding declines in production and labor-time allocation for rubber tapping coincide with horticultural production figures which demonstrate that the average household farming plot was only two tarefas (0.5 hectares) in 1990, but the average amount of land per colocação dedicated to horticulture rose to 5.89 tarefas (1.46 hectares) by 1991 (see Appendices B and C). The change represents a 294.5 percent increase in cultivated land over a five year period. While many of these data are not statistically significant due to extremely high standard deviations, a common occurrence when dealing with such small populations, they indicate a definite adjustment of household production strategies away from extractivism among those families who opted to remain in Antimari.

Many households have discontinued tapping rubber and devoted their energies to their crops even though there are few ways to sell their harvests. This trend is not limited to Antimari but occurs in many places where rubber extraction used to be the dominant economic strategy (Homma 1992:29). Many lack the necessary tools and seed stock for increasing horticulture and continue tapping rubber until they can build a stake with which to buy these farming essentials. However, Figure 8.1 shows dramatic increases in rice, manioc, and maize production between 1989 and 1994. Like data for rubber production, the high standard deviations among the figures shown in Table 8.1 reflect the large variation in quantities produced among households.

Table 8.1. Horticultural Production Figures, 1989 and 1994.

1989 Production (kilos)	Mean	Std. Dev.	Min.	Max.	N
Rice	394.8	357.76	0	1500	41
Beans	200.8	230.93	0	1000	25
Manioc Four	682.45	618.7	0	4000	53
Maize	572.3	539.35	0	3000	51
1994 Production (kilos)	**Mean**	**Std. Dev.**	**Min.**	**Max.**	**N**
Rice	1290.91	1970.46	0	8000	33
Beans	124.24	445.97	0	2500	33
Manioc Four	1746.33	2322.36	0	10000	30
Maize	1166.67	1015.17	0	4000	30

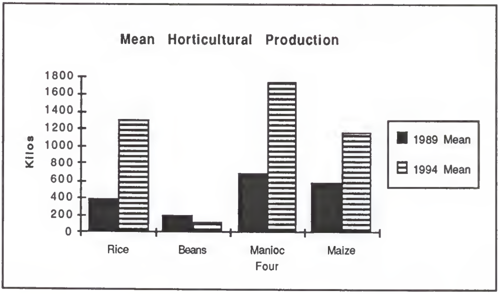


Figure 8.1. Mean Horticultural Production, 1989 and 1994.

Flight - Internal Migration and Emigration

There is an intense migration dynamic in Antimari. "Migration is conceptualized as an integral part of the sustenance strategies the household adopts in response to the opportunities and limitations imposed by conditions that lie beyond the household unit" (Wood 1981:338). In addition to changes in household production strategies among Antimari's families, migration was another strategy adopted as a response to the decline in demand for rubber and the hardships it caused. Migration occurred both within Antimari from colocação to colocação and between Antimari and other areas of the state. Both these types of movement had a common motivation—the search for a better life.

Internal Migration

In 1991, the average number of years a family had been living at their then-current colocação was 11.2 (std. dev. = 8.1). By 1994, the average number of years a local family had been living at their current colocação had dropped to only 6.0 (std. dev. = 7.0). This 46.4 percent drop in time at current residence indicates that increased internal migration is one of the strategies adopted in Antimari in the face of economic crises. These data are even more noteworthy because, in some cases, families appearing in the 1991 survey were resurveyed in 1994 and it would be reasonable to expect 1994 figures to reflect 1991 numbers plus three years instead of showing fewer years between moves than those found in the 1991 survey.

Many families attempt to move to more advantageously located colocações. Frequently, these are colocações along the river that have recently been abandoned by out-migrating families. The majority of households surveyed in 1994 (68.9 percent) had moved from other colocações, 37.8 percent from within Antimari proper and 31.1 percent from other colocações in the states of Acre and Amazonas. Another 25.1 percent of local families had come from the urban areas and six percent had been at their present colocação for generations and had not moved at all. Reasons cited for moving to a new colocação included the following:

- Left previous colocação to be closer to the river,
- Moved from the interior to have better living conditions,
- Left the interior because life is harder there,
- Wanted to leave off rubber tapping and just raise pigs,
- Left the interior because it was so difficult to transport goods to the river,
- Did not want to tap rubber anymore,
- Moved from a colocação in the interior due to problems with neighbors,
- Left the interior to be close to a health post,
- Left the interior because the rubber business gave out.

Considerations vary in importance from each family and some motivations are derived from changes in everyday life that have little to do with economic trends. It is the separate equation of each family's situation that motivates shifts in residence. For instance, at colocação Pobreza, a girl was pregnant at 12 years of age. Both she and the prospective father wanted to cohabitate but did not have the resources to start life at a new colocação so they moved in with a family that had a large colocação along the river. Other examples include Eduardo Galvão who moved to an abandoned colocação along the riverbank because he wanted to leave his natal family at colocação Calamar and devote his time to horticulture; and the newly joined couple from colocação Pimento who moved to be close to family members. There is also the man at colocação Saúde who moved to a new colocação when he married the widow of the former owner.

In 1991, the average number of rubber trees reported per colocação was 404. Among the colocações still tapping rubber in 1994, the average number of trees per colocação was 860. Likewise, the number of rubber trees per trail on occupied colocações rose from 78.0 (std. dev. = 35.4) in 1991 to 121.3 (std. dev. = 59) in 1994. These increases imply that families had abandoned colocações that contained fewer rubber trails and migrated to older, more developed, and more productive sites. They also reflect a general trend away from the more arduous interior and toward areas closer to the riverbank. However, one example of migration away from the river is the case of the Trinidade family of colocação Arari who had to leave their former colocação along the river because the husband had a knack for persuading people to lend him tools and other durable goods. Later, the lenders would reconsider and resent being duped. This has caused enough friction that the family had to move to another colocação. Now the family is in a more resource-poor area, away from the river in the interior at colocação Arari. They are not familiar enough with the new area to efficiently exploit its game resources. Their prospects have decreased due to this move because they are now farther away from the river and thus have no ready access to the transportation and fishing that it provides. No trader ever enters the interior away from the river. Their condition may worsen as they try to farm new land and must await their first harvest while living off of that which they extract from the forest.

Emigration

Migration from one colocação to another within Antimari was a frequent occurrence even before the economic pressures of the late 1980s and early 1990s. But complete escape from the rubber tapping life through emigration also became common, so much so that out-migration is responsible for a reduction in the local population from 441 in 1991 to only 235 in 1994, a decline of 46.7 percent in only three years. Moreover, out-migration seldom included going to another rubber tapping area, indicating that it was not the Antimari area that people were trying to exchange for something new, but the increasingly maladaptive extractivist lifeway that they wanted to leave behind. The decision to emigrate is presumed to be based on cost-benefit analysis on the household level. But Antimari residents' knowledge is far from perfect. The perception of urban residence as superior to rural because of increased access to wage labor, industrialized goods, educational opportunities, and medical facilities, has been common throughout Brazil (see Harris 1956, Margolis 1973). But rural people migrating to the urban centers encounter the following hardships:

- Difficulty in finding jobs,
- Difficulty in finding a place to live,
- Lack of a socioeconomic support network,
- Being considered a person of a social class lower than the urban poor,
- Having little or no money with which to get started,
- Coping with city noise and violence to which they are unaccustomed,
- No longer having the forest resources to fall back on in hard times.

Thus, there are many cases of Antimari families who had sold all their possessions and left for the city seeking a new life, only to fail and regret their actions.

When extractivists go to the city, even just to visit, they are treated with disdain by the urban population who consider them little more then homeless beggars. For example, Antimari resident, Dona Maria related that when she and her children were in Rio Branco, they spent over two hours waiting for transportation in the hot sun at the roadside. She had then knocked at a door to ask for water for her children. Even though a request for water is generally not refused, the resident closed the door in Dona Maria's face. Incidents of poor treatment such as this were reported to be commonplace. Antimari residents have no nice clothes and arrive in town dusty and dirty from their voyage, a trip which entails sitting in dugout canoes, walking along dusty roads, and may mean riding on top of the freight or logs on the back of a tractor-trailer rig. When they then interact with urban dwellers, they must do so in the same dirty and tattered clothes because they have no others.

Migration to the city also means problems for children who find it difficult to attend school in the city. They are unaccustomed to a regimented schedule and fall behind their peers academically. Worse, sometimes there is no room in the schools during the day so they are forced to attend at night, but urban street violence precludes them from safely commuting to and from their residences so they stop attending classes. Finally, parents do not like what city influences do to their children and complain of growing materialism and lack of respect for elders.

Examples of emigration. Interviews with former residents of Antimari revealed a variety of outcomes among those who moved to Rio Branco. To illustrate, an Antimari family who moved to Rio Branco had lived at colocação Carapu along the Antimari river for twelve years but migrated to Rio Branco when their patrão died. Upon leaving, the husband then worked on a ranch for five months to get a stake and then bought land in a bairro in Rio Branco where they have a one-room, plank-walled house with no water but with electricity from an illegal connection to nearby power lines (a common practice). Since their arrival in the city, they have acquired a refrigerator, beds, and a television. The husband now works as a day laborer at construction sites when he can find work. They have visited Antimari one time but do not want to return permanently.

Along with facing declining prices for their rubber, the family of Emilson Cândido came from Antimari to have schooling for their children and because their daughter is lame from being bitten by a venomous snake and has difficulty walking on uneven ground such as found in Antimari's. The wife came to Rio Branco first to work while her husband stayed to tap rubber to accumulate a stake. They then bought a small house in Rio Branco in an old bairro and the husband eventually joined his family in Rio Branco and worked in a nearby sawmill. He now works for the city hall as a gardener and the wife works as a maid. Both husband and wife each earn the equivalent of US $104.40 per month. They have a large house complete with a television, stove, refrigerator, beds, furniture, an electric fan, a blender, and a stroller for their baby. They frequently visit Antimari and relate that they liked life there because they could raise pigs and chickens and always had enough to eat. They also state that life in Rio Branco is harder but they do not want to return to live in the forest.

Ex-Antimari resident Garcia de Castelo had been living in Mapinguari for 26 years where he had been a prosperous patrão. He and his family had been doing very well as the principal trader for the entire middle section of Antimari and he operated the area's largest trading post. He owned the land where many colocações were located as well as over 100 head of cattle. However, inflation made continuing trade difficult and devalued debts that were owed to him by local households until, in June of 1993, the family moved permanently to Rio Branco where he opened a small neighborhood food and necessities store in an outlying bairro. His store is so small that the government does not bother him for taxes and profits are few. He used the money from the sale of his cattle to stock the store and build a modest house. He also made sale agreements with the families who were living at the colocacões that he owned. Payments were to be made in the form of future rubber extraction but no one has paid for the colocações they bought except Sr. Gelson of colocação Volta da Onça. Senhor de Castaelo was one of the most prosperous patrões of Antimari. However, their plank-walled, metal-roofed house in Rio Branco was sparsely furnished. There was a television and refrigerator but the latter did not work. The kitchen area had a gas stove and a 55 gallon drum to hold water. In the yard, their six-meter deep well was dry so they were getting water from a neighborhood sewer and drainage creek. The day I visited the family, a land turtle was tied up in the kitchen waiting to be butchered for a meal along with two five-inch-long fish taken from the same creek—poor fare for a family who operated a food store.

Senhor de Castelo and his wife thought that city life would provide their children with opportunities for schooling. However, there was no room for more students during the day at the local school. Classes were offered at night but the bairro was too dangerous for the children to go to and from school after dark. Consequently, the children did not attend classes. In addition, the adult women of the household reported that urban life was especially difficult for them because they did not often leave the house, not because of danger, but because they knew no one and most urban activities cost money. They said, "There is no place to go." The mother and oldest daughter are in ill-health and cannot work so they stay at home and take care of the children. During the interview, the entire family literally cried about their transition to the city and the life they had lost in Antimari but they cannot go back to their old life as there is no longer a place for a patrão and they can no longer make a living by trading.

Another former patrão and trader in Antimari left the area in 1993 but had had a house in the city for the previous ten years. Over twenty years before, his father had controlled a large part of the land around Limoeiro and had been extending supplies on credit to 16 extractivist families at that time until 1991, when the price of rubber fell to the point where the local tappers' production of rubber and nuts no longer paid for the debts that they incurred. Consequently, he sold his family's cattle to stock a store and furnish their house in Rio Branco and moved to the city. He is still the owner of the trading post at Limoeiro and conducts some trading there through the resident family. In Rio Branco, their house is plastered brick and the family is currently doubling its size with new additions. They also have land in the rear of the house where they keep no more than ten head of cattle which produce milk to sell. The family also operates a small kiosk on the street in front of their house from which they sell cigarettes, soda, cane liquor, and dry goods.

Former residents of Antimari directed me to another family that had moved to the city from Antimari, that of Juarez Constantino. In contrast to the de Castelo family, the Constantinos are happy with their move out of the rainforest. The family lived in Antimari's interior at colocação Triunfo which is a four-hour walk to the riverbank at Mapinguari. Life was hard at their colocação and crops rotted after harvest due to lack of transport. Upon deciding to leave Antimari in 1991, they first went to a ranch near Xapuri where both husband and wife were promised jobs. However, they soon left the ranch after they found that the husband would be paid but not the wife. The husband stayed on working at the ranch clearing forest and the wife and two children now live in a new, rough board, house with a corrugated metal roof on land the family bought in a new bairro on the outskirts of the city. They have illegally tapped into city electric lines to get electricity and have dug a well for water. The house has two shot guns, a refrigerator that does not work due to inadequate electric power, a gas stove, a water filter, three beds, two wardrobe cabinets, a new sofa, a radio and cassette tape player, cassette tapes of music, a television, and new shoes. Their colocação in Antimari was sold for 250 kilograms of rubber but the debt was never paid. The children were five and eleven years of age when they left Antimari. Both go to school and like it. The wife is now a domestic worker. They migrated to Rio Branco to better their lives and the wife feels that they have done so and does not regret their choice. However, the husband feels somewhat differently about the move. He is seldom away from the ranch where he works, just one or two times per month, and stated that he would return to Antimari if he could and if there were a market for his rubber and nut production. The woman's mother comes from Antimari to visit but no member of the immediate family has visited Antimari since their departure for the city.

The family of Antonio Soares left Antimari in 1991. He feels that life is better in Rio Branco even though he misses hunting. This informant stated that life was good in

Antimari but risky because prices were high for supplies and low for rubber. He now has a job as a bricklayer while his wife works at home rearing their two children. He had left Antimari for Rio Branco before but had not found work and returned. Now he says that if conditions were better for tapping rubber he would again return to Antimari.

Although 82.7 percent of out-migrants from Antimari go to Rio Branco, not all families remain there. For example, José Paulo Martins and family left Antimari in 1992. They had lived in Antimari for eight years but the mother was having medical problems due to spontaneous abortions and there was no reliable transportation out of Antimari in case of emergencies. They had relatives in Rio Branco but, upon their arrival, received no assistance from them. Senhor Martins had trouble finding a job and finally settled for selling popsicles from a push-cart. Most days he sold very little. Some days he sold nothing while his wife worked washing clothes for three families. He related that one day he came home and saw his youngest child crying from hunger because there was no food in the house so he went out of the city to hunt. He passed a ranch, asked for a job, and was hired to tend cattle. He moved his family to the ranch where he worked for ten months. During that time he saved his money and then bought 20 hectares of uncleared land two kilometers back into the forest from highway BR-364. There he built a house of planks with a fiber board roof and he, along with a neighbor who inhabits a shack on a nearby ranch, opened and planted 32 hectares of crops including rice, maize, banana, beans and manioc. There is a school for the children two kilometers away and all who are of age attend. There is also a health post two kilometers away from their homestead. The family has now accumulated a gas stove, radio, gun, and a water hole. However, there is no game in the area and it is expensive to pay freight costs to take their crops to the city to sell.

Another case of successful transition out of Antimari is that of the Pereira da Silva family who left a colocação in the remote interior of Antimari in 1985. The family left because there was no school for the children who ranged from one to eleven years of age and life had become increasingly difficult because the trader, who used to take burros all the way to their remote site to collect the rubber they produced, had abandoned them saying that it was no longer profitable to travel so far. The family claims that they were producing 3,000 kilograms per year of rubber from 15 trails at that time and they suddenly had nowhere to sell it. The husband related that upon leaving Antimari, he scouted along BR-364 until he found an area of undeveloped land and bought 776 hectares from the owner who was deeply in debt to a bank. He had also sold eleven head of cattle and 30 pigs so he had accumulated an adequate stake with which to start their new life. He is now 49 years old and no longer grows crops. During the interview, he apologized that he had no meat to offer me for lunch but produced eggs, beans, rice and manioc flour. He also raises chickens, pigs, and some cattle and occasionally works cutting and clearing land for a neighboring rancher for cash. He has a plank house with a corrugated tin roof and mud stove. He stated that he was very content and had no intention of moving.

The above cases are contrasted with that of the Raimundo Nonato Barreto family who left Antimari in 1991 after the local patrão left and transport became difficult. The husband is 27 years old, the wife is 20. They have four children ages 2 weeks to 5 years. The wife stayed with her father at a colocação outside of Antimari for one year before going to the ranch where they currently reside. The husband earns money cutting brush on the ranch where they live rent-free in a small shack. However, as they live on ranch land, they cannot plant crops so Senhor Barreto works with a neighbor on the neighbor's land planting 16 hectares of rice, maize, beans and manioc. When I interviewed them, they had three chickens and two pigs but the house was barren. It literally contained only the following items: one broom, one bucket, one bench, one broken hammer, one mud stove, two hammocks, three plates, two cups, and four spoons. The clothes line had some rags drying on it that looked like remnants of children's clothes. They get fresh milk every day from the neighbor's cow but the children are visibly under-nourished and have chronic coughs. When asked about the future, the wife replied that it, "appeared black."

Emigration and Return

As mentioned above, many families emigrate only to return to Antimari after great hardship trying to make a new life elsewhere. For residents who left Antimari and then returned, the average time spent away was only 2.96 years. Unfortunately, many families who leave Antimari after abandoning or selling all that they have return to Antimari only to find that their abandoned or sold colocação is no longer available to them and that getting started again usually means inhabiting a poorer location (usually one farther away from the river), learning where game can be found, and going into debt for supplies while waiting for their crops to grow. For example, Senhor Artur Albertino and family had sold everything they had in Antimari and moved to Rio Branco where they could find no work. After spending what little money they had on food and lodging, they had no recourse but to return to Antimari. Senhor Albertino related that he does not even want to contemplate ever leaving the forest again.

Other examples include the couple at colocação Cipoal who married in Antimari and out-migrated to Rio Branco, spent seven months looking for work, and then returned to Antimari. Upon their return, they started again with few possessions in a colocação deep in the forest interior. After borrowing some tools, they reopened an abandoned colocação and started life again. Raimundo Goes also went to the city but found no work he could perform as Rio Branco has little to offer to the non-skilled. He related that, when he went job-hunting, he was always asked if he was a carpenter or bricklayer or other skilled craftsman and he could only reply in the negative. Consequently, after three months of looking for work but not finding any, he returned to Antimari to start anew.

CHAPTER 9
DISCUSSION AND CONCLUSIONS

Antimari residents depended upon an economic system in which most of the profits were kept by those who were the owners and providers of transportation, storage, and market access, through trade relationships and credit. However exploitive, these intermediaries enabled extractivists to make a living and maintain their traditional lifestyle. The initial cost of extraction in terms of labor and material remains stable. But the expenses borne by the traders became out-distanced by compensation they received for their participation in the flow of extracted products from Antimari to the national economy, and the supply of industrialized goods to rainforest families. When economic conditions worsened, traders adapted by greatly reducing or stopping their economic dealings with families in remote areas such as Antimari. For the most part, they now maintain only unidimensional, single-transaction, economic relationships with local people. As industrialized goods sold by traders are now priced at over 200 percent of the value in the city, many items such as clothing and radios are no longer being purchased because families no longer have the income from extractivism to pay for them and traders buy few farm products. Nonetheless, they did not become self-sufficient, for they still need to buy industrialized goods and, without a commercial link, they cannot reproduce their lifeway in the remote rainforest. The remoteness of Antimari and its difficult access, coupled with the residents' lack of private transportation, ensure that they remain dependent.

In response to declines in the demand for rubber and the consequent demise of the credit and trading system on which they relied, some families have stayed in Antimari but greatly decreased rubber production, moved closer to the river when possible, and increased their horticultural activities. Others emigrated to local ranches to work as day laborers until they had saved money with which to purchase cheap land in the outlying bairros of Rio Branco or start small farms. Those who established small farms near infrastructure such as roads, schools, and medical facilities, were more successful. But most emigrants moved to Rio Branco directly from Antimari and experienced varying degrees of success in their new lives. As case histories show, the success of their emigration was extremely variable and mainly depended on whether jobs were obtained. Many families who fared poorly in the city returned to the rainforest despite having to start life over again in less desirable colocações and with few possessions.

On Staying in Antimari

Residents of Antimari experienced a decreased demand for local extracted products, an increased cost of industrialized goods, less market articulation, and diminished credit availability. Those who elected to respond to their misfortune by remaining in Antimari did not adapt to these changing economic realities as much as they hunkered down and endured them, trying to continue, as much as possible, their traditional way of life and accepting out of choice or necessity, a lower and more precarious standard of living. Enduring these new economic hardships would be more justified if there were compensating factors. Yet, continuing to remain in Antimari under these circumstances provides local residents no greater access to the things they have always wanted such as access to better education, health care, and markets, and a more secure future. The only compensation cited by those remaining in the forest was the fact that they could continue to hunt and fish to meet many of their dietary needs. Thus, current residents of Antimari are no better off now than before they changed their production focus from rubber to farming. Moreover, the possibility of returning to their traditional extractivist lifeway is less than bright considering the dim outlook for renewed demand for Antimari's rubber. World rubber demand is largely dependent on new and replacement tire needs. The largest producer of natural rubber is Thailand, producing 1.57 million metric tons in 1993. Second in production is Indonesia, producing 1.3 million metric tons during the same year. In order of tonnage produced after Indonesia is Malaysia with 1.07 million, India with 428,100, the Peoples' Republic of China with 325,100, and the Philippines with a production level of 172,000 metric tons in 1993 (Knight-Ridder 1995:221). During that same year, Brazil produced only 33,472 metric tons of natural rubber from both native and cultivated sources (IBGE 1994:4-31). Brazil, despite being the birthplace of the entire rubber industry, is no longer a major player. Today, Brazil produces less than one percent of the world production of rubber and imports more than 75 percent of its natural rubber consumption. Rubber is a strategic resource significant to national security so the Brazilian government considers it important to maintain a domestic source. But current trends are for plantations outside Amazonia that produce cheaper rubber of a more consistent quality and supply. Rubber plantations may reach average yields of 1,500 kilos dry weight of rubber per hectare per year which amounts to an annual production 130,000 tons compared to only 10,000 tons from native sources in Amazonia (Bernades *et al.* 1990:83, 91).

Implications for the Future of Antimari

Antimari may be considered by some to be an under-used area and not exploited to its fullest potential. Pressure to "develop," combined with the change to an agri-based economy by former extractivists may result in short-term gain but it would be at the risk of the environment. If those who remain in Antimari resort to full-time farming, they will change the very nature of their environment and culture. Producing crops for a market is still very risky due to high transportation costs, few transportation and market resources, little credit or capital, and no market-oriented social organization such as a cooperative or farmers' association. Burros and boats with motors or the introduction of roads would solve the transportation problem and motivate expanded agricultural production. However, it could lead to increased deforestation or more intensive use of currently used plots. It could also lead to a lessening of common property ideas and a change in residents' assessment of the land, the value of which would then lie in its ability to produce crops or livestock and not its value as standing forest. In short, there could occur an agro-colonization of the area, i.e. the way of life would be like that of a colony whose subsistence is oriented toward agriculture and not extraction. The forest would then be looked upon as an economic constraint instead of a resource.

An increase in access into Antimari may also attract an influx of migrants, thus creating a greater local demand for game, roads, schools, social services, and cleared land. As these requirements are met by shifting cultivation with ever-decreasing fallow periods or by deforesting to meet increasing agricultural demands and as infrastructural development increases, the area of forest available for extractive activities such as rubber tapping and Brazil nuts collecting, and hunting, would diminish at an ever increasing rate. Antimari would become farm land and not forest. Moreover, as new in-migrants are less familiar with extraction and management of forest resources, their methods may be far more destructive than those of an equivalent number of traditional extractivists and thus environmental resources will be depleted even more rapidly.

The fact remains that, if local residents are turning to farming, they no longer need to live in such a remote location as Antimari. Formerly, living in a remote and underdeveloped area such as Antimari and the hardships it entailed was necessary because the production system was based on tapping rubber. However, if the focus of production changes to farming, there is no longer any reason to forego the benefits of living in a more accessible location and having the markets and infrastructure that Antimari residents yearn for. The lack of rainforest extraction as a fall-back production alternative during difficult times would be considered a cost that would off-set some of the benefits of emigration. However, it must be remembered that extraction has already declined drastically so its value as a production opportunity has already been lost. Migration to farm land close to extractive resources as well as markets might revive extraction as a household productive option.

On Emigration as Adaptation

In contrast to opting to remain in Antimari, emigration can be seen as an active, intentional attempt to adapt to changing economic realities over which local families have no control. Families who left Antimari were demonstrating the adaptive behavior that their ancestors did when they left Brazil's drought-stricken northeast over 100 years before. Antimari's emigrants, like their predecessors, changed lifeways in the face of uncontrollable forces that affected their continued existence. Emigration enabled Antimari families to escape an exploitive economic system over which they had no control and, in most cases, provided them with access to the improved education, health care, and market access that they desired. Not all emigrants became secure and many stated that they regretted having to leave the tranquillity of the rainforest and many missed hunting and fishing. However, all emigrants, regardless of their current level of success in life outside Antimari, gained something that extractivism would probably never provide—opportunities for a better, more secure, future.

Implications for the Future of Extractivisits in General

An estimated 80 percent of the residents remaining in Antimari no longer tap rubber and extract nuts only for domestic use. They now devote their energies to farming even though there are few opportunities to sell their harvests. This trend is not limited to Antimari but occurs in many places where rubber extraction used to be the dominant economic strategy (Homma 1992:29). Richards (1993) estimates that today up to one-half million people in the Brazilian Amazon alone still derive a significant part of their income from extractive products.

Small-scale extraction is extremely important to impoverished households in rural tropical Brazil as a source of cash and extractivism is an important economic supplement for impoverished households in the Amazon region (Hecht *et al.*. 1988). But extractive economies are notoriously unstable due to the highly extensive nature of extractive systems resulting in low yields and high transportation costs (Anderson 1992, Bunker 1982, 1985). In addition, economies based on extraction are always threatened by more intensive economic resource use. Extractivism is probably not viable over the long term (Anderson 1992). Even at its height, it does poorly in meeting basic needs of participants and worse in being a basis for increased prosperity in the future. Rural people possess the tools, labor, knowledge and other inputs necessary for the first expropriation of extractive resources, but they do not possess the means of production past the initial acquisition and processing stage such as adequate storage, transportation, or market contact.

Recommendations for Further Research

Antimari is a smaller, more remote, and less organized group of traditional extractivists. Consequently, it was one of the first to feel the effects of increasingly adverse economic conditions for those who make a living from the rainforest. As unfavorable economic conditions for traditional extraction continue, other better-organized and better-developed extractive economies in the Amazon may become equally affected despite their advantages over Antimari and may be forced to choose from a limited array of adaptive economic strategies similar to what was available to the extractivists of Antimari. The results of continued research on these issues can, therefore, inform development efforts which are aimed at assisting traditional people in making successful changes in their lifeways in response to the Amazon's changing economic realities. In addition, as there is a link between deforestation and the instability of small rural communities, insights from continued study can also help ameliorate factors that contribute to deforestation in the Amazon and other tropical regions by improving local conditions so rural people do not migrate and deforest new frontier areas or become increasingly marginalized after moving to urban centers.

Will the urge to maintain the traditional lifeway in Antimari be so strong that it will outweigh the impoverishment and lowered standard of living now endured by its practitioners? People are notoriously adaptive, and the people of Antimari will continue to adapt, just as their ancestors did when the droughts forced them to abandon their lifeways thousands of miles to the east more than one hundred years ago. It is the effects of their adaptation that warrant further attention.

APPENDIX A
SOCIOECONOMIC SURVEY

1994 Socio-economic Survey - Antimari, Acre, Brazil

01. Questionnaire number
02. Day interviewed
03. Name of Colocação
04. Name of household head
05. Age of household head
06. Place of origin of household head
07. Had household head been a Soldado da Borracha? 0 = Yes, 1 = No
08. Marital Status: 0 = Single, 1 = Married, 2 = Widow/er, 3 = Together but not married
09. Number of living children
10. Are there other dependents living here? 0 = Yes, 1 = No
11. If yes, how many dependents?
12. How long (in years) have they lived here?
13. Are they relatives? 0 = Yes, 1 = No
14. If relatives, are they of the man or the woman? 0 = Man, 1 = Woman
15. Documents Possessed by Household Head: Birth Certificate 0 = Yes, 1 = No
16. Marriage Certificate 0 = Yes, 1 = No
17. Document of Military Service, 0 = Yes, 1 = No
18. Worker's Certificate, 0 = Yes, 1 = No
19. Identification, 0 = Yes, 1 = No
20. Voter's Registration,0 = Yes, 1 = No
21. Union Card, 0 = Yes, 1 = No
22. Is the man of the house able to write his name? 0 = Yes, 1 = No
23. Is the woman of the house able to write her name? 0 = Yes, 1 = No
24. Can the man of the house read and write? 0 = Yes, 1 = No
25. Can the woman of the house read and write? 0 = Yes, 1 = No
26. Can the man of the house do arithmetic? 0 = Yes, 1 = No
27. Can the woman of the house do arithmetic? 0 = Yes, 1 = No
28. If able, how did the man learn to do arithmetic?
29. Is there a school close to here? 0 = Yes, 1 = No
30. If so, how long (in minutes) does it take to travel to the school?
31. How many people of this family could attend school?

Activity Code Key
1. Tap Rubber
2. Collect Brazil Nuts
3. Tend crops
4. Tend livestock
5. Fish
6. Hunt
7. Help at home
8. Study/attend school
9. Other

32. Family Structure: Member no. 1; Name	
33. Sex, 0 = Male, 1 = Female	
34. Age in years	
35. Current residence	
36. Activity Codes	
37. Family Structure: Member no. 2; Name	
38. Sex, 0 = Male, 1 = Female	
39. Age in years	
40. Current residence	
41. Activity Codes	
42. Family Structure: Member no. 3; Name	
43. Sex, 0 = Male, 1 = Female	
44. Age in years	
45. Current residence	
46. Activity Codes	
47. Family Structure: Member no. 4; Name	
48. Sex, 0 = Male, 1 = Female	
49. Age in years	
50. Current residence	
51. Activity Codes	
52. Family Structure: Member no. 5; Name	
53. Sex, 0 = Male, 1 = Female	
54. Age in years	
55. Current residence	
56. Activity Codes	
57. Family Structure: Member no. 6; Name	
58. Sex, 0 = Male, 1 = Female	
59. Age in years	
60. Current residence	
61. Activity Codes	
62. Family Structure: Member no. 7; Name	

Activity Code Key
1. Tap Rubber
2. Collect Brazil Nuts
3. Tend crops
4. Tend livestock
5. Fish
6. Hunt
7. Help at home
8. Study/attend school
9. Other

63. Sex, 0 = Male, 1 = Female	
64. Age in years	
65. Current residence	
66. Activity Codes	
67. Family Structure: Member no. 8; Name	
68. Sex, 0 = Male, 1 = Female	
69. Age in years	
70. Current residence	
71. Activity Codes	
72. Family Structure: Member no. 9; Name	
73. Sex, 0 = Male, 1 = Female	
74. Age In years	
75. Current residence	
76. Activity Codes	
77. Family Structure: Member no. 10; Name	
78. Sex, 0 = Male, 1 = Female	
79. Age in years	
80. Current residence	
81. Activity Codes	
82. Family Structure: Member no. 11; Name	
83. Sex, 0 = Male, 1 = Female	
84. Age in years	
85. Current residence	
86. Activity Codes	
87. Family Structure: Member no. 12; Name	
88. Sex, 0 = Male, 1 = Female	
89. Age in years	
90. Current residence	
91. Activity Codes	
92. Family Structure: Member no. 13; Name	
93. Sex, 0 = Male, 1 = Female	

Activity Code Key
1. Tap Rubber
2. Collect Brazil Nuts
3. Tend crops
4. Tend livestock
5. Fish
6. Hunt
7. Help at home
8. Study/attend school
9. Other

94. Age in years	
95. Current residence	
96. Activity Codes	
97. Family Structure: Member no. 14; Name	
98. Sex, 0 = Male, 1 = Female	
99. Age In years	
100. Current residence	
101. Activity Codes	
102. Family Structure: Member no. 15; Name	
103. Sex, 0 = Male, 1 = Female	
104. Age in years	
105. Current residence	
106. Activity Codes	
107. Family Structure: Member no. 16; Name	
108. Sex, 0 = Male, 1 = Female	
109. Age in years	
110. Current residence	
111. Activity Codes	
112. Family Structure: Member no. 17; Name	
113. Sex, 0 = Male, 1 = Female	
114. Age in years	
115. Current residence	
116. Activity Codes	
117. Family Structure: Member no. 18; Name	
118. Sex, 0 = Male, 1 = Female	
119. Age in years	
120. Current residence	
121. Activity Codes	
122. Family Structure: Member no. 19; Name	
123. Sex, 0 = Male, 1 = Female	
124. Age in years	

Activity Code Key
1. Tap Rubber
2. Collect Brazil Nuts
3. Tend crops
4. Tend livestock
5. Fish
6. Hunt
7. Help at home
8. Study/attend school
9. Other

125. Current residence	
126. Activity Codes	
127. Family Structure: Member no. 20; Name	
128. Sex, 0 = Male, 1 = Female	
129. Age in years	
130. Current residence	
131. Activity Codes	
132. Family Structure: Member no. 21; Name	
133. Sex, 0 = Male, 1 = Female	
134. Age in years	
135. Current residence	
136. Activity Codes	
137. Family Structure: Member no.22; Name	
138. Sex, 0 = Male, 1 = Female	
139. Age in years	
140. Current residence	
141. Activity Codes	
142. Do you receive any kind of assistance? 0 = Yes, 1 = No	
143. If so, from whom? 0=Children, 1=Other relatives, 2=Unrelated neighbors	
144. If so, what type of assistance? 0=Money, 1=Farm goods, 2=Store goods, 3=Labor/other	
145. If so, how often do you receive the assistance? 0=Every month, 1=Once every four months, 2=Once or twice per year	
146. Do you give any kind of assistance? 0 = Yes, 1 = No	
147. If so, to whom? 0 = Parents, 1 = Children, 2=Other relatives, 3=Neighbors	
148. If so, what type of assistance? 0=Money, 1=Farm goods, 2=Store goods, 3=Labor/other	
149. If so, how often do you give the assistance? 0=Every month, 1=Once every four months, 2=Once or twice per year	
150. Is there anyone else working at this colocação? 0 = Yes, 1 = No	
151. If so, In what capacity? 0=meeiro, 1=empregado, 2=diarista, 3=empeleiteiro, 4=amigo	
152. If so, how are they paid? 0=Rubber, 1=Rubber & money, 2=Rubber & nuts, 3=Money, 4=Other	
153. Have you ever worked for another person? 0 = Yes, 1 = No	
154. If so, as what? 0=Meeiro, 1=Empregado, 2=Diarista, 3=Empeleiteiro, 4=Parceiro, 5=Arrendatário, 6=Agregado, 7=Fregues	
155. What work did you do?	

156. How were you paid? 0=Rubber, 1=Rubber & money, 2=Rubber & Nuts, 3=Money, 4=Mercadoria	
157. Migration: Have you always lived in this colocação? 0 = Yes, 1 = No	
158. If not, how long ago (in years) did you arrive?	
159. If not, from where did you come?	
160. Why did you move?	
161. Have you ever lived outside of a seringal? 0 = Yes, 1 = No	
162. If so, for how may years?	
163. If so, where did you live? 0=City, 1= Colony, 2=Ranch, 3=Other	
164. If so, why did you return to the seringal?	
165. Are you the owner of this colocação? 0 = Yes, 1 = No	
166. If so, how was it obtained? 0=Purchase,1=Trade,2=Marriage,3=Father>son,4=Fm other relative,5=Other inheritance,6=Other	
167. Do you have any document of ownership for the colocação? 0 = Yes, 1 = No	
168. If so, what kind of document?	
169. How many rubber trails are there on this colocação?	
170. How many rubber trees are on trail number 1?	
171. How many rubber trees are on trail number 2?	
172. How many rubber trees are on trail number 3?	
173. How many rubber trees are on trail number 4?	
174. How many rubber trees are on trail number 5?	
175. How many rubber trees are on trail number 6?	
176. How many rubber trees are on trail number 7?	
177. How many rubber trees are on trail number 8?	
178. How many rubber trees are on trail number 9?	
179. How many rubber trees are on trail number 10?	
180. How many rubber trees are on trail number 11?	
181. How many rubber trees are on trail number 12?	
182. What is the production in latas per day for trail number 1	
183. What is the production in latas per day for trail number 2	
184. What is the production in latas per day for trail number 3	
185. What is the production in latas per day for trail number 4	
186. What is the production in latas per day for trail number 5	

187. What is the production in latas per day for trail number 6

188. What is the production in latas per day for trail number 7

189. What is the production in latas per day for trail number 8

190. What is the production in latas per day for trail number 9

191. What is the production in latas per day for trail number 10

192. What is the production in latas per day for trail number 11

193. What is the production in latas per day for trail number 12

194. What type of rubber do you produce? 0= smoked, 1=pressed, 2=coagulated, 3=other

195. How many dwellings are on this colocação?

196. Do you have a farinha mill at this colocação? 0=Yes, 1=No

197. How many tarefas did you plant last year?

198. How many tarefas did you plant this year?

199. What will you plant next year? (see codes)

200. Domestic Animals: How many chickens do you have?

201. How many ducks do you have?

202. How many mules do you have?

203. How many horses do you have?

204. How many cattle do you have?

205. How many pigs do you have?

206. Fruit Trees: How many citrus trees do you have?

207. How many banana trees do you have?

208. How many coco trees do you have?

209. How many manga trees do you have?

210. How many caju trees do you have

211. How many orange trees do you have?

212. How many tangerine trees do you have?

213. How many lemon trees do you have?

214. How many lime trees do you have?

215. How many pineapple plants do you have?

216. How many graviola trees do you have?

217. How many cupuaçu trees do you have?

Codes for #199

0=Rice
1=Beans
2=Corn
3=Banana
4=Mamão
5=Mango
6=Tobacco
7=Café
8=Manioc
9=Cane
10=Lemons
11=Pineapple

Laborer Code Key

1. Owner of the colocação
2. Eldest Son
3. Younger son
4. Spouse
5. Eldest Daughter
6. Younger Daughter
7. Meeiro
8. Empeleiteiro
9. Diarista
10. Other relative
11. Assistant

218. How many abacate trees do you have?
219. How many other trees do you have? (specify kind 1)
220. How many other trees do you have? (specify kind 2)
221. Labor Tasks: Maintain access trails; when performed
222. Maintain access trails; number of labor days
223. Maintain access trails; who performs the task - use key
224. Clean rubber trails: when performed
225. Clean rubber trails; number of labor days
226. Clean rubber trails; who performs the task - use key
227. Prepare rubber trees; when performed
228. Prepare rubber trees; number of labor days
229. Prepare rubber trees; who performs the task - use key
230. Tap rubber; when performed
231. Tap rubber; number of labor days
232. Tap rubber;who performs the task - use key
233. Collect and break Brazil nuts; when performed
234. Collect and break Brazil nuts; number of labor days
235. Collect and break Brazil nuts; who performs the task - use key
236. Are all of the Brazil nuts available in the colocação harvested? 0 = Yes, 1 = No
237. If not, how much (in latas) do you think you lose?
238. Do you hunt and fish? 0 = Yes, 1 = No
239. How many deer did you take this year?
240. How many wild pigs did you take this year?
241. How many armadillos did you take this year?
242. How many tapirs did you take this year?
243. How many capivaras did you take this year?
244. How many capelão did you take this year?
245. How many jacu did you take this year?
246. How many nambu did you take this year?
247. How many land turtles did you take this year?
248. How many paca did you take this year?

249. How many prego monkeys did you take this year?	
250. Does anyone in the family fish frequently? 0 = Yes, 1 = No	
251. How many times per week?	
252. When they go fishing how many fish do they take?	
253. How long (in hours) do they stay fishing each time?	
254. How long (In minutes) does it take to get to the fishing spot?	
255. Does anyone in the family produce artesianal items? 0 = Yes, 1 = No	
256. If so, what kinds?	
257. Where did you sell your rubber?	
258. How much in kilos did you sell the first time?	
259. How much in kilos did you sell the second time?	
260. How much in kilos did you sell the third time?	
261. How much in kilos did you sell the fourth time?	
262. What was the price per kilo that you received the first time?	
263. What was the price per kilo that you received the second time?	
264. What was the price per kilo that you received the third time?	
265. What was the price per kilo that you received the fourth time?	
266. To whom did you sell the rubber?	
267. Who transported the rubber?	
268. How was the rubber transported?	
269. How many times did you sell rubber this year?	
270. Do you always sell to the same buyer? 0 = Yes, 1 = No	
271. If not, who are the other buyers?	
272. Were you paid in money or supplies? 0=money, 1=supplies, 2=both	
273. How many times did you sell Brazil nuts this year?	
274. Were you paid in money or supplies? 0=money, 1= supplies, 2=both	
275. Where did you sell your Brazil nuts?	
276. To whom did you sell the Brazil nuts?	
277. How many latas did you sell the first time?	
278. How many latas did you sell the second time?	
279. How many latas did you sell the third time?	

280. How many latas did you sell the fourth time?	
281. What was the price you received the first time?	
282. What was the price you received the second time?	
283. What was the price you received the third time?	
284. What was the price you received the fourth time?	
285. Where do you generally buy your supplies?	
286. Is anyone in debt to you? 0 = Yes, 1 = No	
287. If so, how much?	
288. If so, who?	
289. Are you in debt to anyone? 0 = Yes, 1 = No	
290. If so, how much?	
291. If so, to whom?	
292. What are the most common illnesses found here?	
293. Who usually treats people here? 0=doctor, 1=marreteiro, 2=rezadeira, 3=pratico, 4=agente de saude, 5=other	
294. Are there any physically or mentally impaired people here? 0 = Yes, 1 = No	
295. What are the medicines normally used here?	
296. Has anyone here been sick this year? 0 = Yes, 1 = No	
297. If so, who?	
298, If so what was their ailment?	
299. Do you listen to the radio? 0 = Yes, 1 = No	
300. If so, which station?	
301. Household Production and Consumption: How much rice (in kilos) did you produce last year?	
302. How much rice (in kilos) did you sell last year?	
303. How many kilos of rice are consumed here per month?	
304. Do you buy or trade for any rice? 0 = Yes, 1 = No	
305. How much beans (in kilos) did you produce last year?	
306. How much beans (in kilos) did you sell last year?	
307. How many kilos of beans are consumed here per month?	
308. Do you buy or trade for any beans? 0=Yes, 1=No	
309. How much farinha (in kilos) did you produce last year?	
310. How much farinha (in kilos) did you sell last year?	

311. How many kilos of farinha are consumed here per month?	
312. Do you buy or trade for any farinha? 0=Yes, 1=No	
313. How much corn (in kilos) did you produce last year?	
314. How much corn (in kilos) did you sell last year?	
315. How many kilos of corn are consumed here per month?	
316. Do you buy or trade for any corn? 0=Yes, 1=No	
317. How much coffee (in kilos) did you produce last year?	
318. How much coffee (in kilos) did you sell last year?	
319. How many kilos of coffee are consumed here per month?	
320. Do you buy or trade for any coffee? 0=Yes, 1=No	
321. How much tobacco (in kilos) did you produce last year?	
322. How much tobacco (in kilos) did you sell last year?	
323. How many grams of tobacco are consumed here per month?	
324. Do you buy or trade for any tobacco? 0=Yes, 1=No	
325. How many liters of honey did you produce last year?	
326. How many liters of acai did you produce last year?	
327. How many liters of patoa did you produce last year?	
328. How much abacaba did you produce last year?	
329. How many pigs did you produce last year?	
330. How many pigs did you sell last year?	
331. How many pigs were consumed here last year?	
332. How many pigs do you buy or trade for per year?	
333. How many ducks did you produce last year?	
334. How many ducks did you sell last year?	
335. How many ducks were consumed here last year?	
336. How many ducks do you buy or trade for per year?	
337. How many chickens did you produce last year?	
338. How many chickens did you sell last year?	
339. How many chickens are consumed here per month?	
340. How many chickens do you buy or trade for per year?	
341. How many eggs did you produce last year?	

342. How many eggs did you sell last year?	
343. How many eggs are consumed here per month?	
344. How many horses did you have last year?	
345. How many horses did you sell last year?	
346. How many horses have you bought or traded for?	
347. How many burros did you have last year?	
348. How many burros did you sell last year?	
349. How many burros have you bought or traded for?	
350. How many cattle did you have last year?	
351. How many cattle did you sell last year?	
352. How many cattle are consumed here per year?	
353. How many cattle do you buy or trade for per year?	
354. How much milk (in liters) do you produce per month?	
355. How much milk (in liters) do you sell per month?	
356. How much milk (In liters) do you consume per year?	
357. How much milk (in liters) have you bought or traded for?	

APPENDIX B
LABOR ALLOCATION AND PRODUCTION DATA, 1991

	Labor		Rubber Production						Brazil Nut Production		Horticultural Production	
			Production			Time Allocation						
Survey Case Number	Total Available Labor in Adult Units	Annual Adult-Days Labor Available	Quantity Rubber Trees Tapped at Colocação	Quantity Rubber Produced Per Year in Kilos	Total Adult Units Labor for Rubber Prod.	Quantity Days/Year Allocated to Tapping Rubber	Annual Adult-Days/Yr. Allocated to Rubber	% Annual Adult-Days Labor Devoted to Rubber	Quantity Nut Producing Trees at Colocação	Quantity Nuts Produced Last Year (in latas, x 12 = kilos)	Quantity Tarefas Planted Last Year (+ 4.03 = hectares)	Quantity Tarefas Planted This Year (+ 4.03 = hectares)
001-91	2.00	624	1440	900	1.00	130	130	20.83	200	23	6	8
002-91	2.00	624	330	0	0.00	0	0	0.00	20	15	1	3
003-91	2.00	624	240	500	1.00	60	60	9.61	20	15	0	3
004-91	3.50	1092	520	1000	2.00	120	240	21.97	40	120	3	3
005-91	4.00	1248	330	650	1.50	174	261	20.91	48	35	2	2
006-91	3.50	468					0			14	0	6
007-91	2.00	624	388	500	1.00	256	256	41.02	200	30	2	4
008-91	5.00	1560	467	200	3.00	312	936	60.00	15	15	2	6
009-91	2.50	780	310	600	1.00	130	130	16.66		31	2	2
010-91	3.75	1170	220	500	1.50	76	114	9.77	200	46	2	4
011-91	2.50	780	811	700	1.00	130	130	16.66	300	150	2	3
Mean	2.98	872.18	505.60	555.00	1.30	138.80	205.18	21.74	115.89	44.91	2.00	4.00
Std. Dev.	1.03	343.23	370.28	296.69	0.79	91.27	259.14	17.17	108.43	46.17	1.61	1.90
Minimum	2.00	468.00	220.00	0.00	0.00	0.00	0.00	0.00	15.00	14.00	0.00	2.00
Maximum	5.00	1560.00	1440.00	1000.00	3.00	312.00	936.00	60.00	300.00	150.00	6.00	8.00
Number	11.00	11.00	10.00	10.00	10.00	10.00	11.00	10.00	9.00	11.00	11.00	11.00

APPENDIX C
LABOR ALLOCATION AND PRODUCTION DATA, 1994

	Labor		Rubber Production						Brazil Nut Production		Horticultural Production	
			Production			Time Allocation						
Survey Case Number	Total Available Labor in Adult Units	Annual Adult-Days Labor Available	Quantity Rubber Trees Tapped at Colocação	Quantity Rubber Produced Per Year in Kilos	Total Adult Units Labor for Rubber Prod.	Quantity Days/Year Allocated to Tapping Rubber	Annual Adult-Days/Yr. Allocated to Rubber	% Annual Adult-Days Labor Devoted to Rubber	Quantity Nut Producing Trees at Colocação	Quantity Nuts Produced Last Year (in latas, x 12 = kilos)	Quantity Tarefas Planted Last Year (+ 4.03 = hectares)	Quantity Tarefas Planted This Year (+ 4.03 = hectares)
001-94	6.50	2028	825	200	3	152	456	22.48		60	8	10
002-94	3.50	1029	335	0	1	228	228	20.87		180	18	18
003-94	5.25	1638	0	0	0	0	0	0		0	1.4	0
004-94	5.25	1638	410	80	1	152	156	9.52		43	8	8
005-94	6.00	1872	780	0	0	0	0	0		12	8	8
006-94	2.00	624	180	0	0	0	0	0		25	5	8
007-94	6.75	2106		0	0	0	0	0		0	5	6
008-94	11.25	3510		0	0	0	0	0		20	8	8
009-94	2.50	780	2100	1050	2.5	208	520	66.66		76	8	6
010-94	2.00	624	900		1					350	4	4
011-94	5.25	1638	675	75	3					198	5	5
012-94	5.00	1560			4		0	0		0	6	6
013-94	3.50	1092	732	32	2		208	19.04		20	4	6
014-94	6.75	2106	477	150	3					150	9	5
015-94	4.00	1248	1050	50	1					40	4	14
016-94	4.75	1482	2100	400	0	0	0				16	16
017-94	6.75	2106	1125	0	0	0	0	0		100	4	4
018-94	4.50	1404	480	100	2					200	5	5
019-94	5.00	1560		200	2							
020-94	3.75	1170	1350	500	1	208	208	17.77		200	3	3
021-94	5.00	1560	300	300	2.5					330	3	7
022-94	2.25	780										
023-94	3.25	1014	460	116	1					250	5	5

	Labor		Rubber Production						Brazil Nut Production		Horticultural Production	
			Production			Time Allocation						
Survey Case Number	Total Available Labor in Adult Units	Annual Adult-Days Labor Available	Quantity Rubber Trees Tapped at Colocação	Quantity Rubber Produced Per Year in Kilos	Total Adult Units Labor for Rubber Prod.	Quantity Days/Year Allocated to Tapping Rubber	Annual Adult-Days/Yr. Allocated to Rubber	% Annual Adult-Days Labor Devoted to Rubber	Quantity Nut Producing Trees at Colocação	Quantity Nuts Produced Last Year (in latas, x 12 = kilos)	Quantity Tarefas Planted Last Year (+ 4.03 = hectares)	Quantity Tarefas Planted This Year (+ 4.03 = hectares)
024-94	2.00	624	300	500	1					35	0.5	0.5
025-94	8.00	2496		700	1	208	208	8.33		350	4	8
026-94	6.50	2028	390	348	2.5	104	260	12.82		680	6	4
027-94	2.00	624		190	1					575	3	2
028-94	6.50	2028	222	0	0	0	0	0		0	4	8
029-94	2.00	624	400	40	1	234	234	37.5			2	2
030-94	3.75	1170	430	750	1	208	208	17.77		0	0	0
031-94	5.50	1716	1680	588	2	224	448	26.1		0	8	0
032-94	6.00	1872	1200	1500	2	208	416	22.22		0	4	4
033-94	3.25	1014	2550	300	1	208	208	20.51		0	8	4
034-94	5.00	1560	960	0	0	0	0	0		0	8	9
035-94	4.00	1248	1280	300	1	189	189	15.14		50	1	1
Mean	4.72	1473.51	846.11	264.66	1.28	115.05	164.46	13.77		127.23	5.63	5.89
Std. Dev.	2.02	628.47	640.87	347.33	1.09	101.90	168.59	15.92		174.15	3.83	4.28
Minimum	2.00	624.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.00	0.00
Maximum	11.25	3510.00	2550.00	1500.00	4.00	234.00	520.00	66.66		680.00	18.00	18.00
Number	35.00	35.00	28.00	32.00	34.00	22.00	24.00	23.00	0.00	31.00	33.00	33.00

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BIOGRAPHICAL SKETCH

Gary W. Shaeff was born in Philadelphia, Pennsylvania on December 7, 1956. After serving eight years in the U.S. Navy and working as an expedition leader in Inner Mongolia and the People's Republic of China, he earned a bachelor's degree in history with a minor in Asian studies from the University of North Florida in Jacksonville, Florida, and a master's degree in anthropology and a graduate certificate in Latin American studies from the University of Florida in Gainesville, Florida. He completed his studies for the Ph.D. in anthropology at the University of Florida in April, 1998.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Gerald F. Murray, Chair
Associate Professor of Anthropology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Clyde F. Kiker
Professor of Food and Resource Economics

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Maxine L. Margolis

Maxine L. Margolis
Professor of Anthropology

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Marianne Schmink

Marianne C. Schmink
Professor of Latin American Studies

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

Nigel J. H. Smith
Professor of Geography

This dissertation was submitted to the Graduate Faculty of the Department of Anthropology in the College of Liberal Arts and Sciences and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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Dean, Graduate School